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THE  
JOURNAL  
OF  
THE ASIATIC SOCIETY  
OF  
BENGAL.

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VOL. III.

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THE  
JOURNAL  
OF  
THE ASIATIC SOCIETY  
OF  
BENGAL.

EDITED BY

JAMES PRINSEP, F. R. S.

SECRETARY OF THE AS. SOC., AND HON. MEM. OF THE AS. SOC. OF PARIS.

VOL. III.

JANUARY TO DECEMBER,

1834.

"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta; it will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease."

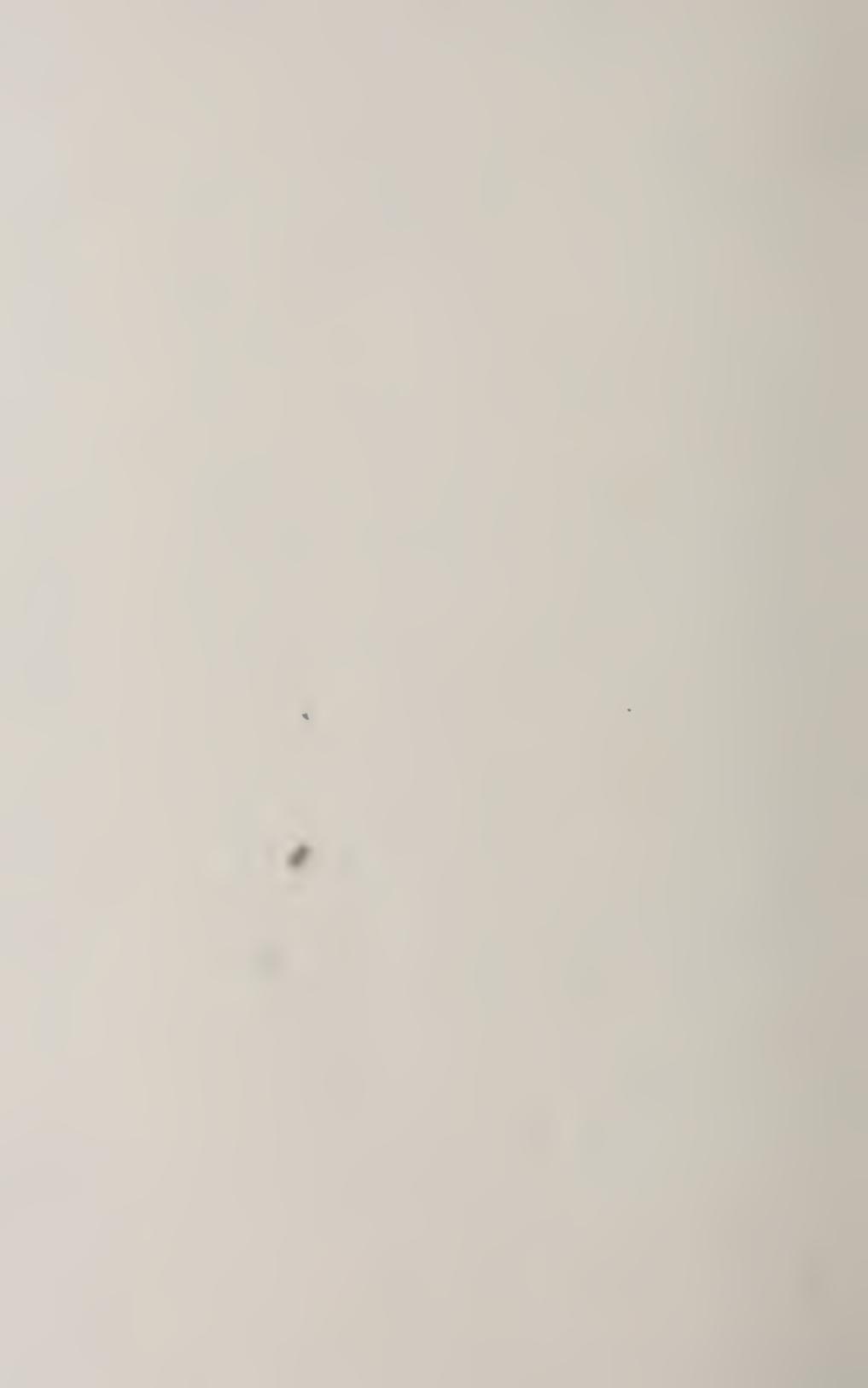
SIR WM. JONES.

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1834.



# JOURNAL

OF

## THE ASIATIC SOCIETY.

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No. 28.—April, 1834.

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I.—*Memoir on the Ancient Coins found at Beghrām, in the Kohistán of Kábul. By Chas. Masson.*

[Read at the Meeting of the 30th instant.]

[We hasten to give to the world the results of Mr. MASSON's successful researches in the Numismatology of Bactria, for the communication of which to this Journal we are mainly indebted to Dr. J. GERARD, who was for some days in company with the author at Kabul, and had an opportunity of inspecting his large and valuable collection of coins, and of certifying, that the drawings of those selected to illustrate the present memoir are faithful and accurate.

We are most happy to comply with the author's request in sending copies of the memoir to the several officers and gentlemen indicated.]

IT will be unnecessary in this place to enter upon a detail of ALEXANDER's conquests in central Asia, the rise and fall of the Greek Bactrian monarchy, and other events, which, as they have lately become a topic of popular attention, are daily receiving more familiar illustration. I shall therefore proceed at once to the subject of this memoir.

In July of the present year (1833), I left the city of Kabul, to explore the districts north of it, at the base of the mountains Hindoo Kúsh, with the primary object of identifying the site of Alexandria ad Cauca-sum. Although upon this question I defer a decision, until I can consult the ancient authorities, there being many spots which would agree therewith in a local point of view,—I was recompensed by the discovery of numerous interesting objects, and among them of the site of an ancient city of immense extent, on the plain now called Beghrām, near the confluence of the rivers of Ghorbund and Punjsheer, and at the head of the high road leading from Khwojeh Khedree of Kohis-tan, to Nijrow, Taghow, Lughman and Jelalabad. I soon learned that large numbers of coins were continually found on the plain of

Beghram, and my first excursion put me in possession of about eighty, procured with difficulty, as their owners were suspicious of my motives in collecting them. The coins were of such a type and description, as naturally increased my ardor in their research; and, succeeding in allaying the mistrusts of the finders, I obtained successive parcels, until up to this time (November 28th, 1833), I have accumulated 1,865 copper coins and fourteen gold and silver ones, the latter Brahminical and Cufic. Of course many of these are of no value, but I persevered in my collection, under the hope of obtaining ultimately perfect specimens of every type and variety of coin; in this I have but partially succeeded, so great is the diversity of coins found at this place, that every fresh parcel of 100 or 150 coins yields me one or more with which I was not previously acquainted.

I may observe, that, on my return to Kabul, from my first excursion, I found two persons there, busy in the collection of coins. I left them the field of the city, and confined my attentions to the more distant and ample one of Beghram. Besides, as my object was not merely the amassing of coins, but the application of them to useful purposes, I hailed with satisfaction the prospect of obtaining a collection from a known spot, with which they would have, of necessity, a definite connection, enabling me to speculate with confidence on the points they involved.

I suppose that no less a number than thirty thousand coins, probably a much larger number, are found annually on the *dusht* or plain of Beghram, independently of rings, seals, and other trinkets. Gold and silver coins occur but rarely. If we allow a period of five hundred years, since the final extinction of this city, (and I have some idea that negative proof thereof may be adduced,) and if we allow, as I presume is reasonable, that the same or not a less number of coins has been annually extracted from its site, we have a total of fifteen millions, a startling amount, and which will not fail to excite curiosity as to this second Babylon. The antique treasures of Beghram, until their partial diversion this present season, have been melted in the mint at Kabul, or by the coppersmiths of that city and of Chareekar. The collection of them is made by Afghan shepherds, who sell them by weight at a very low price to itinerant *misghurs* or coppersmiths, who occasionally visit their tents, and these again melt them down themselves, or vend them at a small profit to the officers of the mint.

The coins of Beghram comprise five grand classes, viz. Greek, Indo-Seythic, Parthian, and Guebre, Brahminical, and Muhammedan, and each of these classes contains many varieties or series. I have ventured to

attempt their arrangement, and if my plan be found correct, the classification I should hope will materially assist the study of these coins, and their application to historical elucidation. In this memoir I shall only treat of the two first classes, as I have not leisure to include the three other classes—the study of which, however useful and necessary, is more obscure, and cannot be conducted without the assistance of historical reference, which of course I cannot command here. Of the Guebre coins, which are found in considerable numbers, it may be generally observed, that the conquests of Arsaces Mithridates will explain their appearance in these countries; but I incline to think we may recognize a distinct Parthian dynasty, which may possibly have been founded by some enterprising viceroy under his successors. I sometimes indulge the hope of identifying a Parthian metropolis in the neighbourhood of Kabul. As Sassanian coins are also discovered, it would seem probable that these countries were also at some period dependent on the princes of the house of SASSAN. The Brahminical coins, that is, such as are clearly so from their Nagree inscriptions, I calculate may chronologically be placed in succession to the Sassanian ones; and that they formed the circulating species of these countries at the period of the Muhammadan invasion, is proved by coins with Nagree legends on the one side, and Cufie on the other.

*General Observations.—Class, Grecian—Series No. 1.*

*Coins of the Recorded Kings of Bactria.*

The Greek coins found in these countries are naturally the most interesting. Of the recorded kings of Bactria, we find at Beghram the coins of three only, viz. MENANDER, APOLLODOTUS, and EVERATIDES the 1st or Great. It may sometimes happen that a medal of EUTHYDEmus is to be met with at Kabul, but it must always be considered an importation from Balkh. The coins of the two first Bactrian princes, THEODOTUS I. and THEODOTUS II. we ought not to expect here, as it is certain that their rule did not extend south of the Caucasus, the present Hindoo Kush. EUTHYDEmus, the third prince, we may conjecture profited by the diverted attention of ANTIOCHUS the Great from his eastern provinces to the Roman invasion, and passed this mountain range; but the absence of his coins leads us to infer that he may have died before he had effected a settlement of the countries invaded by his arms. Of the celebrated MENANDER, we have numerous coins; the features on most of them, those of youth; on none of them, those of age. The legend of no one coin describes him as king of Bactria and India, nor is the epithet ΝΙΚΑΤΩΡ to be found, as applied to him by SCHLEGEL, but that of ΣΩΤΗΡ. His recorded conquest of a great part of India must therefore have been subsequent to his ascending the throne in Bactria.

Colonel TOD observes, that, he could not fix the period of the conquest of Bactria by MENANDER; leading us to infer that he was a prince of the Greek dynasty on the Hyphasis; it would appear certain however that MENANDER was a king of Bactria, who extended his conquests very far into India, according to the direct testimony of PLINY—which is corroborated by PLUTARCH, who, in his valuable and honorable mention of him, styles him MENANDER, a king of the Bactrians.

Of APOLLODOTUS we have several coins, and their discovery in these countries proves the fact of his having reigned in them, which has been doubted by some, who have alike referred him to the dynasty on the Hyphasis.

It must be confessed, that our views are not at present quite clear relative to the reigns and successions of the Bactrian princes: if the ehronological data of SCHLEGEL be correct, we have from the aseension of APOLLODOTUS to sovereignty 195 B. C. to that of EUERATIDES 181 B. C., but an interval of 14 years, which may have been very naturally filled by the reign of the former, while we have the names of three princes, MENANDER, HELIOELES, and DEMETRIUS, who have claims more or less to be considered kings of Bactria. Fortunately, we have other kingdoms to which to assign them, should their pretensions to that of Bactria be found inadmissible. These points, and some others will shortly receive much elucidation, when we become acquainted with the nature of the coins found north of the Hindoo Kúsh.

The coins of EUERATIDES I. or Great, are very numerous, and of very spirited execution. I believe they are not to be found east of Kabul, which, if ascertained to be a fact, yields grounds for the hypothesis, that in his time, an independent Greek kingdom existed west of the Indus, whose capital was the ancient Nysa, or near the modern Jelalabad. That such a kingdom existed at the later period, we have the satisfaction of being able to demonstrate to a certainty.

We have discovered no coins of DEMETRIUS, supposed to have been a son of EUTHYDEMUS; it is fair to infer then that he never ruled in these countries. Colonel TOD assigns him to the dynasty on the Hyphasis, of which he has some claims to be considered the founder, and which we may credit until farther researches may confirm or controvert the opinion.

We are alike without any evidence of HELIOELES, whose claim to be reputed a sovereign of Bactria appears to have been advanced by MIONNET, on the authority of a single medal.

We find no coins of the last of these kings, EUERATIDES II. although his reign was not a short one, (twenty-two years, according to SCHLEGEL.) As he ascended the throne by the murder of his father,

it is not unlikely that the parricidal act was followed by anarchy and the dismemberment of many of his provinces;—the absence of his coins at Beghram would seem to countenance such an opinion, and the distracted state of his affairs was probably favorable to the inroads of the Getæ, who destroyed his empire.

The coins of the kings of the regular Bactrian dynasty are of excellent workmanship, and have monograms or cras, from which an accurate estimation of their reigns may, it is hoped, be adduced. The inscriptions or legends of the reverses are invariably Pehlevi, which proves it to have been the current language of these countries at the period of the Macedonian conquests. The Greeks, as conquerors, inserted on the obverses, their own characters, and by them we recognize their princes, after a lapse of twenty centuries. Under the auspices of the present viceroy of India, the English language seems likely to become generally known throughout the eastern empire; and should this splendid purpose be effected, at some remote period, when the natural revolutions of political authority may have placed the natives of India under their own government, or that of other conquerors, they may still retain a fond and grateful remembrance of their former rulers, while they cherish their language and literature.

*Class, Grecian—Series No. 2. Coins of ΑΝΤΙΛΑΚΙΔΟΣ and ΑΥΞΙΟΣ*

These coins I have classed as a distinct series, and introduced them here, because independently of the beards, which are not borne by the Bactrian kings, or by the early monarchs of the Nysæan dynasty, it is impossible to allow that the sovereigns were Grecian, both from their names and epithets—while the fine execution of the coins, and the pure Greek characters of the legends, seem to place them at a period synchronous or nearly so with the Bactrian monarchs. The conical emblems on the coins of ΑΝΤΙΛΑΚΙΔΟΣ we fortunately detect by a single specimen to have been also adopted by EUCRATIDES; and this circumstance establishes a connection, if merely that of descent or succession. My opinion of these coins is, that they belong to princes of an inferior dynasty, who ruled in the mountainous districts of Caucasus, consequent to the destruction of the Bactrian empire, and until their subjugation by the Nysæan rulers. Their metropolis may have been Alexandria ad Caucasum. In the districts where that city is naturally to be looked after, viz. in the Kohistan of Kábul, we find every indication that a capital has existed, which has varied its position and name, in much the same manner as Babylon. These coins have fortunately monograms, which may contribute to their better explanation.

*Class, Grecian—Series No. 3. Coins of ΑΓΑΘΟΚΛΗΣ, ΠΑΝΤΑΛΕΩΝ, &c.*

This singular description of coins fortunately presents us with the name of the princes, although we are denied the satisfaction of beholding

their features ; and no data are furnished on which we may fix the dynasty to which they may have belonged. Setting aside the curious form of these coins, their designs are well executed, and the obverse legends expressed in pure Greek characters. This circumstance induces me to insert the series here, and I should consider the dynasty a distinct one, perhaps under nearly the same circumstances as the preceding. The consideration of the coins with the legend ΒΑΣΙΛΕΩΣ ΠΑΝΤΑΛΕΟΝΤΟΣ made me at first hesitate whether to regard ΑΓΑΘΟΚΛΕΟΥΣ as a name, or, an epithet; as both descriptions of coins, from the coincidence of obverse and reverse, seem to refer to the same prince. A series of uncouth formed coins I have included under this series, from the agreement of the obverses : the reverses exhibit elephants. These Leonine coins have no legends, but figures, which may be their monograms.

*Class, Grecian—Series No. 4. Coins of the Nysæan Dynasty.*

We now come to a series of coins, which it is gratifying to identify as belonging to Greek princes, whose seat of empire was at the ancient city of Nysa, or Dionysiopolis, founded agreeably to Sanscrit and Greek records by Bacchus or Dionysius. Hercules, the tutelary Bactrian deity, is represented on some of these coins, and a horseman, alike a Bactrian emblem, on others. These coins, with respect to their type and execution, exhibit many incongruities : on many, while the bust is well executed, and the features well delineated, the Greek characters of the legends are very corrupt. Happily, the Pehlevi legends are generally fair and distinct. The princes of this dynasty would seem to have been numerous, probably of more than one family ; it is to be hoped, we shall be enabled ultimately to identify all of them : at present we have three if not four princes of the same name ΕΡΜΑΙΟΣ ; a ΣΑΤΗΡΗΣΓΑΣ ; and an ΤΝΑΔΦΕΡΡΟΣ\*. We have the coins of others, the legends illegible.

*Class, Grecian—unarranged Coins.*

These coins I have not referred to distinct series, as it is probable that legible specimens will enable us to refer them to some of the preceding ones. The coins of ΕΡΜΑΙΟΣ have a similarity in nomenclature with those of the Nysæan dynasty, but it will be noticed, that the quadrangular form is not adopted with the latter—another of the coins has the figure of Hercules, and another, the epithet ΜΕΓΑΛΟΥ, the former a Bactrian and Nysæan emblem, the latter only observed on the coins of EUKRATIDES I.

Among the supplementary coins which were not found at Beghram, and are not in my possession, the coins with the horseman on the obverse are certainly Nysæan ; on the reverses is the figure of Ceres ; these coins are remarkable for their fair circular form, the pure Greek

\* We follow the ms. : but the second of these names is evidently ΣΩΤΗΡ ΜΕΓΑΣ, see further on.—ED.

characters of the legend, and for being generally plated over with silver. They are found generally, I believe exclusively, in the neighbourhood of Jelalabad.

*Class, Indo-Scythic—Series No. 1. Coins of KANHPKOΣ, &c.*

The coins of KANHPKOΣ exhibit two varieties as to the reverse. The one representing a figure standing to the right, with the legend in Greek characters ΝΑΝΑΙΑ, the other a figure standing to the left, with the legend ΗΙΟC. This species of coin has been supposed by the Editor of the Journal of the Asiatic Society in Bengal, to belong to KANISHKA, a Tartar conqueror of Bactria. It is gratifying to be able to conjecture somewhat plausibly, that the capital of the prince whose coins are now the subject of our discussions, was at Kábul, a fact which may confirm or destroy the opinion of his having been KANISHKA. M. CSOMA DE KOROS, from Tibetan authorities, informs us, that a prince KANISHKA reigned at Kapila, supposed to have been near Hurdwar: and Mr. WILSON endeavors to fix the birth-place of SAKYA at Kápila, which he places in Oude. If the locality of Kapila rest on supposition only, and we be allowed the latitude of reading Kabila, and we find from Mr. WILSON's notice that the name is actually so written in one dialect and Kimboul in another, we have a great approximation to Kábul or Kabool—the question will be nearly set at rest, and KANISHKA may have been the prince here designated KANHPKOΣ. But if Kapila cannot be allowed to represent Kabul, then we may doubt whether these coins refer to KANISHKA. But certain will it be that they belong to a prince whose metropolis was Kábul. As I find very plausible reasons are advanced for bringing the epoch of KANISHKA to agree with that of the overthrow of the Bactrian monarchy, and consequently for inferring, that, that event was effected by him, the remark forces itself from me that Bactria was conquered from the north by the Getæ, and not from the east or north-east by the Sacæ. That the Getæ and Sacæ were distinct Scythian nations, was too well known to the ancients, to allow their historians and geographers to confound them: we find even the Latin poet Horace aware of the distinction. I doubt whether the Getæ at the period of their inroad upon Bactria made any settlement, assuredly not a permanent one, in the countries now called Afghanistan; nor do I feel certain, that, the Greeks did not rally and recover their authority in Bactria. A better acquaintance with the country will enable us to judge more decisively on these points. The barbarians appear to have proceeded southerly, and to have settled themselves, in Kuchee, Sind, and the Punjab, where they probably absorbed the Greek kingdom on the Hyphasis. In the countries named, their descendants still form the great mass of the population, and pre-

serve their ancient name, Jet. The Greek kingdom of Nysa may have sprung up on the subversion of that of Bactria, or, may have been coeval with its latter existence; be this as it may, we are warranted in the belief, that, it flourished for a long subsequent period: and it is only after its extinction that we can consider the coins of ΚΑΝΗΡΚΟΣ chronologically, as we cannot suppose sovereigns reigning synchronously at Nysa, or Jelalabad, and Kábul. The type and general appearance of these coins favor all these suppositions, and while we identify them as belonging to a dynasty whose metropolis was at Kábul, we may conclude it to have succeeded the Greek one of Nysa. Whether the Nysean government was subverted by ΚΑΝΙΣΗΚΑ I cannot determine, but if so, his era must have been considerably later than about 130 B. C.

The king on these coins appears in the double character of king and priest. My acquaintance with Buddha literature is too slight to enable me to affirm that such was the character of their princes. The altar we can by no means allow to be a fire altar, that is, as connected with the worship of MITHRA; it is simply an altar, to which indeed fire is a general accompaniment, or at least when incense is to be offered, in the act of which the king here appears to be employed. This altar very fortunately occurs, as it permits us to connect at least five distinct varieties of coins without the possibility of error.

*Series No. 2. Coins of ΚΑΔΦΙCHC, &c.*

The exact coincidence of the costume and position of the king, with the presence of the incense altar on these coins, can leave no doubt of their connection with those of ΚΑΝΗΡΚΟΣ, and establishes the fact of the sovereigns belonging to the same dynasty. A tope opened at Kábul by M. M. HONIGSBERGER proved to be the sepulchral monument of ΚΑΔΦΙCHC and from it was extracted a basin of factitious metal, with a gold coin, the legend on which was ΒΑΣΙΑΕΤC ΚΑΔΦΙCHC-ΟΟΗ (a representation of this coin is given as a supplementary one). This discovery is of eminent importance, as fixing the capital of the sovereigns of this dynasty beyond doubt. The copper medals of ΚΑΔΦΙCHC, are of very fair execution; the legends on the obverses corrupted, but very legible Greek. They ally with the gold medal, have the same monogram ΟΟΗ, which may be of much assistance. I incline to place the series of ΚΑΔΦΙCHC before that of ΚΑΝΗΡΚΟΣ in a chronological point of view.

*Series No. 3.*

This series may very safely be placed in succession to the two former, while the absence of the altar proves them distinct. I have not leisure to offer many remarks, which these coins suggest; but as the legends are evidently Greek, or intended for such, I trust that eventually we shall be able to appropriate them with certainty.

The princes, whose coins constitute the two grand classes, just noted, excluding those of the recorded Bactrian monarchs, may, I conclude, be supposed to fill up by their reigns the period between the overthrow of the Bactrian empire and the subjugation of the provinces west of the Indus by **ARSACES MITHRIDATES**. The former event occurred about 130 years A. C. and the latter without means of reference I cannot determine\*. The coins of Beghram are by no means exhausted, and fresh collections will doubtlessly put us in possession of many new ones; indeed, I have now a few unintelligible coins, both Greek and Indo-Scythic, whose types although unrecognizable are certainly different from those described. The princes whose coins are found on any known spots or site, may fairly be held to have reigned there. In the first or Grecian class, the Beghram collection yields us two princes of Series No. 2, two at least of Series No. 3, eight at least of Series No. 4, or the Nysæan princes, and two at least of the unarranged coins—making a total of fourteen Greek kings. The Indo-Scythic class yields us at least nine princes; if the reigns of the whole of these princes be averaged at fifteen years each, the total gives a period of a hundred and forty-five years, which would bring us to about 25 A. D. New discoveries will certainly carry us to a much later period.

I shall now close these brief and general remarks on the Greek and Indo-Scythic coins of Beghram, which I had intended to have made public, at a future period, and in a more formal manner, in England, had I not been apprized of the intense interest excited by recent discoveries in this species of antiquities. I write from a country particularly interesting, and the neighbouring regions are perhaps as much so, at least to the antiquarian and historian, as any in the world. The Hindoo Kúsh alone intervenes between us and Badakshán, where if we may not be so sanguine as to allow its princes even the honor of a bastard descent from **ALEXANDER the GREAT**, we may be gratified in beholding the posterity of **OXARTES**, his father-in-law, and of **SISYMMITHRES**, his benefactor and friend, or of those who govern in their seats; also of solving the geographical, problem as to the source of the Oxus, by ascertaining whether it issue from a glacier as represented to **MR. ELPHINSTONE**, or whether it emanate from a lake as recorded by **PLINY**.

For the last six or seven years, I have directed my attention to the antiquities of Central Asia, particularly to the vestiges of its Grecian conquerors and rulers. In spite of conflicting circumstances, I have made many discoveries, which one day, by the favor of the Almighty, I shall make public. I shall not remit my labors: notwithstanding

\* **VAILLANT** places this event in the year 144 A. C. and the final subjugation of Bactria by the Scythians in 126 A. C.—ED.

the inevitable casualties of time, notwithstanding the defect of historical records, notwithstanding the merciless and destructive ravages of Muhammadan conquerors, I think, I trust, we have sufficient evidences and indications still remaining, to enable us to decide with certainty, or to arrive at plausible conjectures on, most of the interesting points connected with these countries, from the period of the Macedonian conquests to the introduction of the Islam faith.

P. S. *Remark on the Etymology of Manikyala.*

General VENTURA proposed as the etymology of *Manikyala*, "the City of the White Horse." Mr. WILSON, very properly dissatisfied with this explanation, substituted that of "the City of Rubies." I beg to propose another which appears to me to be the correct one, and peculiarly appropriate to the building being a Buddhist monument. We find the term *Manya* or *Lord* and *King*, applied to *Sakya* and other Buddhist princes; thus *Sakya Manya*, "our Lord *Sakya*;" *Abhi-Manya*, our Lord *Abhi*. *Kyala*, signifying "a place," that is of any kind, why should we not read *Manikyala*, "the place or grave of our Lord or King," that is "the King's Grave;" a simple etymology, coinciding with the purpose of the monument, truly Buddhist\*, and which will prevent us from bestowing on a city, a name, I suspect, it never had. It is singular and deserving of notice, that of all the topes so numerously found in various parts of these countries, that of *Manikyala* alone should have preserved its original Buddhist name.

*Enumeration of Coins collected from Beghram, by C. M.*

Class Grecian—Series 1. Recorded Kings of Bactria :

Menander, .....	39
Apollodotus, .....	19
Eucratides, .....	70
	— 128
Series 2. Antilakides, .....	8
Ausius, .....	6
	— 14
Series 3. Agathocles, .....	10
Pantaleon, .....	2
Coin without legends, .....	20
	— 32
Series 4. Hermæus, I. .....	34
Hermæus, II. .....	136
Hermæus, III. .....	10
Sotereagas, .....	171
Unadpherros, .....	19
Coin with horseman on the obverse, .....	8
Coin as Fig. 41, .....	6
	— 384

\* On Mr. BURNES and myself visiting *Manikyala*, his Munshi or surveyor instantly remarked the similarity of the structure to that of *Buddha* monuments in *Bombay*.—J. G. GERARD.

Unarranged, Hermæus, .....	2
Single specimens, .....	8
	— 10
	Total, Greek Coins, 563
Class Indo-Scythic—Series 1, Kanerkos,.....	24
As fig. 3 and 4,.....	22
As fig. 5, .....	6
As fig. 6 and 7, .....	16
	— 68
Series 2, Kadphises,.....	37
As fig. 3, 4, and 5,.....	254
	— 291
Series 3, As fig. 1 to 6, .....	56
As fig. 7 to 9, .....	56
As fig. 10, .....	9
As fig. 11, .....	113
	— 234
Unarranged and ambiguous, .....	12
	— 605
	Total, Indo-Scythic Coins,.... 1173
Guebre Coins, Parth. and Sass.....	161
Nagree, .....	34
Cufic, .....	122
	— 1490
Unintelligible and useless, chiefly Indo-Scythic, as Figs. 3, 4, & 5, of Series, No. 2, .....	375
	—
Grand Total, Copper, .....	1865
Gold and Silver, Cufic, &c.....	14
	—
	1879

*Analysis of the Beghram Greek Coins with reference to Plates.*

Plate VIII. Series 1st—Recorded Kings of Bactria.

MENANDER.

Fig. 1. *Obverse.* A helmed head with Greek legend ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΜΕΝΑΝΔΡΟΥ.

*Reverse.* A figure of victory standing to the left, the right-hand stretched holds a wreath, the left-hand depends by the side, and holds a palm branch, legend Pehlevi.—Monogram Η B.

This is one of fifteen quadrangular coins in my possession. I selected it for a specimen, both on account of its superior preservation, and of the youthful appearance of the king. They all essentially agree, excepting that on the others the figure of victory is standing to the right. The monograms vary, HE and ΗΣ. On these coins the features of the celebrated Menander display the various transitions from youth to manhood.

Fig. 2, *Obverse.* Head of elephant, with legend as preceding.

*Reverse.* A lengthened figure (fish?) legend Pehlevi—Monogram H A.

Fig. 3, *Obverse* and reverse as preceding—Monogram appears to be A P.

Fig. 1, is one of twenty-one copper quadrangular coins in my possession, with the same monogram, although struck at various times and with different dies.—Fig 2 is given on account of the variance, in the form of the elephant's head, and of the monogram ; it is the only one of the coinage I have met with.

Fig. 4, *Obverse.* A helmed head with usual Greek legend.

*Reverse.* Figure of owl—legend Pehlevi—monogram

This is an unique specimen—a beautiful coin. The owl, it is well known, was an emblem of Minerva, and, figuratively, of Wisdom.

APOLLODOTUS.

Fig. 5, *Obverse.* Figure of Apollo, standing to the left, his right-hand holding a dart or arrow ; left resting on a bow—the legend ΒΑΣΙΛΕΩΣ ΑΠΟΛΛΟΔΟΤΟΥ ΣΩΤΗΡΟΣ.

*Reverse.* Emblem with two supports, in an oblong square, defined by dots or points—legend Pehlevi—on the right of the emblem is an ambiguous character, which may be the monogram.

Fig. 6, *Reverse.* Emblem with three supports. (Oracular tripod of Apollo at Delphos ?)—legend Pehlevi—monogram to the left of the emblem and ambiguous. The obverse of this coin resembles the preceding, therefore not given.

Fig. 7, *Obverse.* Figure of Apollo standing, facing the front—legend the usual one.

*Reverse.* The same tripodal emblem, differently designed—legend Pehlevi—monogram

These are three from nineteen copper quadrangular coins in my possession, and will shew the various types of the coins of Apollodotus. Figures 5 and 7 are single specimens. The omission of the prince's bust will be here noticed, and the substitution of the deity Apollo, to whom he was probably consecrated on his birth, whence his name Apollodotus, or the gift of Apollo.

EUKRADITES.

Fig. 8, *Obverse.* Helmed head—Greek legend ΒΑΣΙΛΕΩΣ ΜΕΓΑΛΟΥ ΕΤΚΡΑΤΙΔΟΥ.

*Reverse.* Two horsemen in charge, with spears couchant, and palm branches—legend Pehlevi—monogram

Fig. 9, *Obverse.* As preceding.

*Reverse.* As preceding—monogram

There are two specimens from sixty-six copper quadrangular coins in my possession. They are all of excellent workmanship, and the figures in spirited relief :—the features of the king are so clearly and strongly delineated as to impress us with the conviction of the fidelity of the portrait, and we recognize therein, a sovereign worthy of his epithet “ The Great.” The monograms vary from the two noted above, to , , and ; the most prevalent is .

Fig. 10, *Obverse.* Helmed head—legend ΒΑΣΙΛΕΩΣ . . . . ETKI . . .

*Reverse.* Two conical emblems with palm branches—legend Pehlevi.

This is one of two copper quadrangular coins in my possession. The letters ETKP being indubitably distinct, can only refer to a prince of the name Eukratides, while the epithet ΜΕΓΑΛΟΥ obliterated on this specimen, being legible on the other, we may safely appropriate them. The conical emblems resembling bee-hives are here first noticed, which is to be remembered, as they are also adopted on the coins of a prince to be next noticed.

Fig. 11, *Obverse.* Helmed head with usual Greek legend.

*Reverse.* Female deity sitting, with turreted crown like Cybele ; to the

right one of the conical emblems—beneath the figure a straight scalloped line.

This, specimen is unique, the obverse in fine preservation; the reverse a little defaced.

Fig. 12 *Obverse*. Helmed head.

*Reverse*. Two horsemen in charge. Legend ΒΑΣΙΛΕΩΣ ΜΕΓΑ ....

An unique specimen—form oval :—although the name is not to be found here, from the horsemen on the reverse, and the epithet, we can have no doubt of its belonging to “Eucratides the Great\*.”

Plate IX. Series 2.—ANTILAKIDES.

Fig. 13, *Obverse*. Bearded bust, with fillet or wreath around the head, a palm branch or similar emblem projecting from behind the neck. Greek legend .... ΦΟΡΟΥ ΑΝΤΙΛΑΚΙΔΟΥ.

*Reverse*. Two conical emblems, with two palm branches, Legend Pehlevi. Monogram K.

Fig. 14, *Obverse*. Bust—legend ΒΑΣΙΛΕΩΣ ΝΙΚΗΦΟΡΟΥ ΑΝΤΙΛΑΚΙΔΟΥ.

*Reverse*. As preceding—monogram obliterated.

These are two from eight copper quadrangular coins in my possession. The first is of very spirited design, and the venerable features of the king are those of a Homer or a Socrates. The beard on these coins is somewhat singular, as it is not observed on the coins of the early Greek princes. The legends are in pure Greek characters. The conical emblems on the reverse, we have, as noted before, been so fortunate to discover on a single coin of EUCRATIDES, proving that they are Bactrian. On two other coins we have distinctly the monogram ΑΣΣ.

AUSIUS.

Fig. 15, *Obverse*. Bearded bust, with wreath round the head—hair terminating in a pad—palm branch projecting from behind the neck. Greek legend. ΑΣΙΛΕΩΣ ΑΝΙΚΗ.... ΤΣΙΟΥ.

*Reverse*. Figure of elephant—legend Pehlevi.

Fig. 16, *Obverse*. Bearded bust, as preceding. Greek legend ΒΑΣΙΛΕΩΣ ΑΝΙΚΗ-ΠΟΥ ΑΤΣΙΟΥ.

*Reverse*. Figure of elephant—legend Pehlevi—monogram ΑΣΣ.

These are two from six copper quadrangular coins in my possession—all of fine workmanship and design—the legends are in pure Greek characters. I read the name AUSIUS; should the first letter by any chance be Α in lieu of A, it will become LUSIUS, equally a Grecian name. It is curious that the monograms on these coins should be the same with those on some of ANTILAKIDES; it may be that the year expressed by ΑΣ was the last of the reign of ANTILAKIDES, and the first of that of AUSIUS, who from his aged features will not have been the son, but the brother, of the former, a supposition which the great resemblance in features, similarity of costume, &c. tend to confirm. The elephant on the reverse I suspect has no particular or mystical meaning: it was necessary to place some figure, and this was fixed upon, to let mankind know that the monarch was potent, and had such animals at command. The elephant, for like reasons, is to be seen on some of the coins of SELEUCUS, which I have procured at Bagdad. Why these two princes affected the beard and barbarian head-dress in preference to the warlike helms of

\* I have a similar coin, presented by Captain WADE, in which the name ΕΤΚΡΑΤΙΔ.. is perfect.—ED.

† Probably ΑΝΙΚΗΤΟΥ, *invicti*.—ED.

the Bactrian princes, is difficult to decide, and although their high sounding epithets make us desirous of being better acquainted with them, I apprehend we shall only be enabled to allow them a limited sway in the regions south of the Caucasus; probably, as I have hinted before, their capital was Alexandria ad Caucasum.

*Series 3.—AGATHOCLES.*

Fig. 17, *Obverse.* Lion standing to the right. Greek legend ΒΑΣΙΛΕΩΣ ΑΓΑΘΟΚΛΕΟΥΣ.

*Reverse.* Female deity, with flower in right-hand. Legend Pehlevi.

This is one of ten copper quadrangular coins in my possession.

These coins, I presume, are sufficiently interesting; and fortunately, the pure Greek characters of the legend leave no doubt as to the name of the prince. The same AGATHOCLES occurs in history, having been borne by the celebrated tyrant of Sicily;—by one of ALEXANDER's generals;—and by his grandson, the illustrious son of LYSIMACHUS, king of Thrace, put to death by his father on account of the base and false information of his step-mother ARSINOE, the sister of PTOLEMY SOTER, king of Egypt. He was killed about 283 B. C. While we are at a loss to assign the epoch of the prince, whose coins we now consider, we may be assured that he flourished near that of the Bactrian dynasty, or ere the Greek arts and perspicuity of language had declined. The deity on the reverse has no positive marks by which to identify her. If it be a flower she holds in her hand, she may be Flora; if heads of wheat, she may be Ceres, or perhaps Proserpine the daughter of Ceres;—the evidence is too slight, however, even to authorize an opinion.

*PANTALEON.*

Fig. 18, *Obverse.* Lion standing and facing to the right. Greek legend ΒΑΣΙΛΕΩΣ ΠΑΝΤΑΛΕΟΝΤΟΣ.

*Reverse.* Female deity with flower in right-hand. Legend Pehlevi\*.

This is one of two copper quadrangular coins in my possession. The exact coincidence of the figures on the obverses and reverses make us fain to consider these coins as referring to the same prince as the preceding, notwithstanding the variation in the Greek legend. PANTALEON signifies in Greek "in all things a lion," that is, always brave. I know not whether to consider this term an epithet, or a name, nor do I remember whether as the latter it occurs in history†. These coins have no monograms.

Fig. 19, *Obverse.* Figure of lion standing to the left, over the back the character ♫—under the head, another of this form, ♫.

*Reverse.* Figure of elephant—over the back the character ♫.

This is one from twenty copper quadrangular coins in my possession, the character noted on the reverse, not plain on the coin here represented, is supplied from another where it is distinct. These coins are mere wavy lumps, the obverses struck with a square formed die in the bulk of the metal, the obverses rising in relief above the surface. It must be owned, that the absence of legends renders their appropriation difficult‡, and I have included them in this series only from the

\* The characters of the legend on this and on the following coin, resemble very closely those of the inscription on the Allahabad column, No. 1, (see page 112.) It will be important to trace them further.—ED.

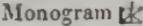
† A PANTALEON occurs as a king of Pisa, who presided at the Olympic Games B. C. 664.—ED.

‡ Some light will I think be thrown on these coins by Captain CAUTLEY's discovery near Scháranpur.—ED.

coincidences of the lion, the clumsy form of the coins, and the peculiarity to be observed in the sunken character of the obverses. The monogrammatical characters, it is feared, are too obscure to allow much to be gained from them.

*Series 4.—Nysæan Princes, HERMÆUS I.*

Fig. 20, *Obverse.* Bust with wreath around the head; hair dressed in curls, with fillets hanging down behind. Legend Greek, nearly obliterated.

*Reverse.* Figure of male deity, probably HERCULES, sitting on a throne, right hand extended and holding a wreath. Legend Pehlevi. Monogram .

This is one from twenty-eight copper coins in my possession; it is represented here from the fine preservation of the bust, which enables us to become admirably acquainted with the features of the prince.

Fig. 21, *Obverse.* Same as preceding. Greek legend ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΕΡΜΑΙΟΤ.

*Reverse.* As preceding.

This is one of six copper coins of the same size, on which the whole of the legends are clear and distinct. On the larger coins they are always imperfect, from the dies having been too large for them. By a comparison of these also, no doubt remains as to the intended legend. The coins of this prince are remarkable for the fair execution of the bust; the Greek characters are pure, but vary in regularity of form on many specimens, as they may have been struck at various periods, and by different dies. The position of HERCULES on the reverse reminds us of the coins of EUTHYDEMUS. From every circumstance connected with these coins, we must place HERMÆUS very nigh the Bactrian epoch. In setting him at the head of the Nysæan princes, I must confess I have only negative grounds, and incidental conjectures. We cannot identify him with the Bactrian series; his name forbids it. That he was a prince of power and talent, his coins attest, and his portrait so happily preserved on them, convinces us. That he governed at Nysa is proved by his medals being found there; I therefore, in absence of more direct evidence, consider him a prince of Nysa, perhaps the founder of the dynasty there. All his coins agree in the same cast of features, those of a prince of fifty to sixty years of age. On a comparison of the Nysæan coins, we may suppose him the father of the youthful HERMÆUS, whom I call the 2nd; and that his epoch was anterior to HERMÆUS, whom I call the 3rd, is evident from the decline in the execution of the coins of the last, and from the corruption of the Greek characters on their legends. The adoption of the same name by these three princes seems to prove a connection of descent and lineage, so does the figure HERCULES on the coins of HERMÆUS the 3rd. That this prince ruled at Nysa, we have the best evidence, because we have his sepulchral monument there.

*HERMÆUS II.*

Fig. 22, *Obverse.* Bust with diadem, fillets depending behind. Greek legend, illegible.

*Reverse.* Female deity (?)—legend Pehlevi—monogram ambiguous.

Fig. 23, *Obverse.* Bust as preceding. Greek legend, portion legible, ΣΩ. ΣΥ. ΕΡΜΑΙΟΥ.

*Reverse.* As preceding. Monogram .

These are two from ten copper coins of the same size and type in my possession, the legend on the obverse, had the size of the coins allowed its full exhibition, would obviously have been ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΣΥ ΕΡΜΑΙΟΥ.

These coins are well executed, the figures in good relief, and the artist has done justice to the features of the youthful king; there are some points of coin-

cidence between these coins and those of HERMÆUS I. which deserve to be pointed out. The figure on the obverse, I could wish had been a male, (but fear it is not,) as its position agrees with that of HERCULES on the coins alluded to. The monogrammic characters agree on both, or nearly so, and the style of the Greek characters is precisely the same. Thus in the coins of the preceding series, we have noted the epithet ΣΩΤΗΡΟΣ, has the O in the final syllable ; in those of HERMÆUS I, we first note the substitution of □, and it is continued in those before us. If the letters ΣV be the epoch, we have 74 probably of the Nysæan dynasty. These would seem to require other sovereigns before HERMÆUS I. and if it be necessary, our conjectures may supply them.

### HERMÆUS III.

Fig. 24, *Obverse.* Bust, with diadem and fillets. Greek legend, portion legible ΒΑΣΙΛΕΩΣ Σ ΤΗΡΟΣ ΕΡΜ...

*Reverse.* Figure of HERCULES, with club. Legend Pehlevi.

Fig. 25, *Obverse.* Bust, as preceding—Greek legend—the characters visible, confused from the use of dots or points at their angles.

These are two specimens from sixty copper coins of the same size and type in my possession, besides which I have seventy-six smaller ones. These coins display a decline in style and execution, although in neither point of view absolutely bad. The smaller specimens are much inferior, many of them even wretched. The difference in size between the dies and the coins, here also prevents us from obtaining any one specimen with the entire legend, but the letters EPM of the name distinct on a few, allow us to read the whole EPMAIOT as the preceding ones. On the reverses, the figure of HERCULES is not to be mistaken. The legend on these coins from a general comparison will appear to be ΒΑΣΙΛΕΩΣ Σ ΤΗΡΟΣ ΣΕ EPMAIOT. If ΣΤΗΡΟΣ or ΣΤΗΓΟΣΣΕ have no signification as an epithet, I may suggest that ΤΗΡΟΣ be read ΣΩΤΗΡΟΣ and ΣΕ be understood as the epoch, which will be fortunate, as in numerals it will be 75, and the coins of HERMÆUS II. give us ΣV or 74\*. That he died young may be inferred from our meeting with none of his coins on which he has a more aged appearance than the one found present. The coins now considered are very numerous. I am not quite certain whether we may not eventually find on some of them, other names than that of HERMÆUS. It is fortunate that the Pehlevi characters on the reverses are in much better style than the Greek characters ; a natural circumstance, as the artists were probably no longer Greeks, but natives, whose vernacular language was the former.

Satisfactory it is to be enabled to assert that the burial place of HERMÆUS the III. was near the modern Jelalabad, near which I feel convinced was the celebrated city of Nysa. A tope called Janní Tope in its neighbourhood was opened by M. MARTIN, who extracted therefrom three small boxes of stone, containing trinkets and other trifles more curious than useful ; also, loosely lying among the earth, were found between twenty and thirty of the copper coins of HERMÆUS, rusty and defaced indeed, but easily recognizable as of the same type as those here described.

### SOTEREAGAS†.

Fig. 26, *Obverse.* Bust, with diadem and fillets behind hair in rows of curls ; rays

\* The Greek numerals must then be read ME and MΔ.—ED.

† I have left this as it stands in the MS. but there can be little doubt that the title is ΣΩΤΗΡ ΜΕΓΑΣ as read on the coins described and depicted by myself in the second volume of the Journal, (plates ii. xi. and xiii,) but with these plates before him, the author still finds reason to read the inscription ΗΕΓΑΣ.—ED.

of glory around the head ; right-hand holding a sword, mace, or emblem of command. Behind the head, a trident or symbol of supreme authority.

*Reverse.* Horseman, the ends of his turban flowing in the wind ; his right hand extended, and holding what may be a short sword ; horse caparisoned, and apparently furnished with saddle ; before the horse a tridental symbol. Legend Greek, portion visible, ΘΩΤΗΡΗΕΓΑС ВАСΙАЕВ ВАСИАЕ...

Fig. 27, *Obverse.* Bust, as preceding, sword or mace in right-hand, adorned with ribbons.

Fig. 28, *Reverse.* Horseman, as in Fig. 26. Legend Greek ВАΣΙΛΕУΣ ВАСИΛЕУН ΣΩΤΗР.

Fig. 29, *Obverse.* Helmmed head, looking to the left ; before the figure a symbol difficult to explain, behind it the usual trident.

Figures 26, 27, and 28, are from fifty-five copper coins of the same size and type in my possession ; Fig. 29 is from an unique specimen. Besides these I have one hundred and fifteen smaller copper coins of the same type. The whole of these coins are distinguished for the bold relief of the busts and figures.

That the prince, whose medals are now before us, ruled and died at Nysa, is established by the fact of twenty-seven (I think) of his copper coin, similar in type to Fig. 26, having been extracted from his sepulchral monument in the neighbourhood of Jellalabad by M. MARTIN. When we learn that this monarch's coins are found generally over the Punjab and north-western provinces of India, even to Benares, we form high notions of his extended empire, and conceive exalted opinions of his talents, which are confirmed by the mauly portrait disclosed on his medals. We feel a pride in drawing from obscurity a line of princes, whose edicts emanating from Nysa, would seem for a considerable period to have influenced the political destinies of a large part of Asia.

There are many points connected with these coins which deserve attention. On the obverses we first observe the king's head, surrounded with rays ; we also here first observe the trident ; an emblem to be found on all the succeeding coins of this class we have to notice. I presume this to be an emblem of supreme authority, but nothing more ; as such I believe it was borne by NEPTUNE and other gods of the Grecian mythology. On the reverse we have a horseman, a Bactrian Greek emblem, and on many of the coins, as Fig. 26, the Greek characters of the legend are much corrupted. On earlier coins of this prince, as Fig. 28, the legend is in fair Greek, and varies, as not comprising the ΗΕΓΑС to be found in the first noted. The earlier coins have also a much younger appearance, as Fig. 27.

I hesitate whether to consider СΩΤΗРΗЕГАС, a name or an epithet, or a compound of both. I incline to the latter, considering that СΩΤΗР be understood an abbreviation of СΩΤΗРС and that ΗЕГАС is the name of the prince : accordingly on some of the coins as before noted, we find the legend only ВАСИАЕΩС ВАСИАЕУН ΣΩΤΗР\*. On the other hand, or the coins of a prince hereafter to be noticed, we find СΩΤΗРНЕГАС inserted apparently as an epithet. This prince however we can scarcely suppose Greek. Persons more conversant in the Greek language than I am, must decide this point.

Fig. 29, is a spirited and valuable coin ; we rejoice to behold the warlike king, helmed after the manner of his Bactrian ancestors. On this we first observe a

\* This might have taught the author the real meaning of the inscription, but we purposely avoid correcting the text.—ED.

singular emblem which whatever it may be, serves to connect the next coin we notice with the Nysæan ones. On the coins of SOTEREAGAS, the title king of kings is first to be observed, borrowed probably from the Parthians.

The reverse of this coin is not given, so exactly corresponding with that of the first figure, even as to the corrupted Greek characters, that it would appear to have been struck with the same die.

Fig. 30, *Obverse.* Horseman. Legend Greek, but defaced.

*Reverse.* Figure (female ?) looking to the right; behind her an emblem, the same as noted in Fig. 29; in front another singular globular emblem.

This is an unique specimen, which, until legible specimens be procured, must remain unappropriated. That it refers to the Nysæan princes is proved by the horseman, which here forms the obverse, and by the singular emblem before alluded to—the new emblem, no less curious, alike serves us in the arrangement of the three next coins which follows :

Fig. 31, *Obverse.* Horseman.

*Reverse.* Figure standing to the left, with globular emblem.

Fig. 32, *Obverse.* Horseman, with trident.

*Reverse.* Figure standing to the right, with globular emblem.

Fig. 33, *Obverse.* Horseman. Legend Greek, portion legible ΛΕΩΣΒΑΣΙΛΕΩΝ.

*Reverse.* Figure standing to the left, with globular emblem.

These three coins, from the types and symbols, we can pronounce Nysæan; perhaps Fig. 31 and 33 may be the same—on the latter the Greek characters are pure and distinct.

#### UNADPHERROS.

Fig. 34, *Obverse.* Bearded bust, with diadem and fillets behind, jiker on head. Legend Greek; portion legible, ΑΣΙΑΛΕΑΣ ΣΩΤΗΡΟ.

Fig. 35, *Obverse.* Bust. Legend Greek, portion visible, ΦΕΡΡΩΥ ΒΑΣΙΑΕ...

Fig. 36, *Reverse.* Winged figure of victory standing to the right, with wreath; legend Pehlevi.

There are three from nineteen copper coins of the same size and type in my possession. The figure of the prince is somewhat remarkable, but I hesitate not to believe him Greek, notwithstanding his beard; neither do I doubt of his connection with Nysa. From a comparison of the united specimens, the Greek legend is undoubtedly ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΤΝΑΔΦΕΡΡΟΤ. The tufts on the head I have considered the jiker, a plume of feathers worn to this day by Asiatic princes as an emblem of royalty. The Sadu-zye princes of Afghanistan were wont to wear four jikers, and such of their grandees or officers whom they wished to distinguish by their favor, they allowed the permission of wearing one, or even two. The reverses of these coins have the figure of victory, also to be seen on those of MENANDER.

Fig. 37, *Obverse.* Bust, with diadem and fillets behind; row of pearls beneath diadem.

*Reverse.* Horse standing to the left, with forefoot raised. Legend Greek, but obscure, ΒΑΣΙΛΕΑ legible.

This is one from six copper coins in my possession. I at first considered it Nysæan, from the horse on the reverse, as well as from the beardless bust of the prince; but although I have included it here, I now very much doubt; and am even not certain that it may not be Parthian—if any of the princes of that line are to be found without a beard. The legend is written in straight lines in place of the

usual Greek peripheral form:—from a comparison of the six specimens, it will appear to be ΒΑΣΙΛΕΑΝ. ΗΛΙΑΛΕΥ ΗΛΙΑΛΙΝΗ: the last letter I am not clear whether it be not intended for Ν. Two or three larger copper coins of this prince have been found in Kabul, on which the head is most preposterously large, the legend on these is still more unintelligible: a representation of one of these is given in the supplementary coins, fig. 48.

*Unarranged Greek Coins.*

Fig. 38, *Obverse.* Bust. Legend Greek ΒΑΣΙΛΕΩΣ ΣΩΤΗΡ ΕΡΜΑΙΟΥ.

*Reverse.* Horse standing to the right, forefoot raised—singular character ♀ under his belly. Legend Pehlevi.

This is one from two copper coins in my possession—the pad on the head is here to be noticed—the name ΕΡΜΑΙΟΥ is beyond doubt, but I could not class this coin with those of Nysa, as the Greek characters of the legend refer to an antecedent period; the quadrangular form of the coinage also forbids it.

Fig. 39, *Obverse.* Figure obscured by time. Legend Greek, but illegible.

*Reverse.* Macedonian infantry soldier probably of the phalanx, standing to the left, his right-hand extended and holding a wreath, armed with spear, sword, and shield. Legend Pehlevi.

This is an unique specimen in my possession; another was procured in Kahul, which I have represented in the supplementary coins, fig. 43; by this it will be seen that the figure on the obverse is that of HERCULES with his club. The legend, here more intelligible, is unfortunately not sufficiently so, as to allow the identification of the coin.

Fig. 40, *Obverse.* Figure obliterated. Legend Greek, but nearly effaced.

*Reverse.* Figure apparently female, seated on a throne. Legend Pehlevi.

This is an unique specimen in my possession; another was procured at Kahul, represented in the supplementary coins, fig. 44, which shew that the figure on the obverse is one standing to the left, with a tridental staff in the right-hand. It also shews that part of the Greek legend is ΒΑΣΙΛΕΩΣ ΜΕΓΑΛΟΥ. The epithet it will be observed was that adopted by EUCRATIDES I. I doubt whether these coins can be referred to him from the presence of the characters Λ and Δ in the legends, which indicate a later period.

Fig. 41, *Obverse.* Lion rampant. Legend Greek, but defaced.

*Reverse.* Humped cow. Legend Pehlevi.

This is an unique specimen in my possession—the figures are in high relief.

Besides the coins here noticed, I have five other single specimens, which, although unintelligible, are certainly Greek. Among them is a curious hemispherical coin. On the convex obverse is manifestly the delineation of a head; on the reverse that of some animal. I give not the representation of this and the others, because nothing is gained from them, but the knowledge that our collection of Greek coins is not completed, and that farther discoveries remain to reward research.

*Supplementary Greek Coins.*

Fig. 42, *Obverse.* Helmed bust. Legend Greek, ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΜΕΝΑΝΔΡΟΥ.

*Reverse.* Warrior, in right-hand holding a dish of grapes or fruit, the left-hand upraised, holding a bundle of darts. Legend Pehlevi.

This is a beautiful silver drachma, procured at Kahul, by M. MARTIN. The figure on the reverse admirably illustrates the just ideas which influenced the illustrious sovereign in his government. We need no excuse for introducing any token

which renders us more familiar with the youthful, the beautiful, and beloved MENANDER.

Fig. 43, *Obverse.* Figure of Hercules, with club. Legend Greek.

*Reverse.* Macedonian infantry soldier. Legend Pehlevi.

Fig. 44, *Obverse.* Figure with tridental staff. Legend Greek.

*Reverse.* Figure seated. Legend Pehlevi.

These coins have before been alluded to, they were procured by M. MARTIN.

Fig. 45, *Obverse.* Horseman, with Greek legend, portion legible, ΒΛΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ

*Reverse.* Figure of Ceres. Legend Pehlevi.

Fig. 46, *Obverse.* Horseman. Greek legend, portion legible, ΒΑΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ.

*Reverse.* Figure probably of Ceres. Legend Pehlevi.

Fig. 47, *Obverse.* Horseman. Legend Greek, but obscure.

*Reverse.* Figure of Ceres. Legend Pehlevi.

These coins evidently refer to the Nysæan princes, they were procured at Jelalabad by M. MARTIN—the inscriptions are in pure Greek characters. These coins were originally coated over with silver.

Fig. 48, *Obverse.* Bust.

*Reverse.* Horse with fore-foot raised. Legend Greek, but obscure.

This coin has been before alluded to, it was procured by M. MARTIN I believe at Jelalabad.

*Class Indo-Scythic—Series No. 1.*

Fig. 1, *Obverse.* Figure of prince sacrificing on altar. Legend Greek, but partially preserved, portion visible, ΛΕVC BA ΙΛΕΩΝ KA

*Reverse.* Female figure standing to the right: before her, a four-pronged symbol. Legend Greek, NANAIA.

This is one of seven copper coins of the same size and type in my possession, the legend is unquestionably from a comparison of the specimens BACΙΛΕVC BACΙΛΕΩΝ KA-NHPKOT or "The King of Kings KANERKOS." These coins have attracted much attention. I have taken the liberty of making my remarks generally on them in the former part of the memoir. With reference to the legend NANAIA, I may observe, that, there are numerous shrines in these parts of Asia, called by the Muhammedans, the *Zedrats* of *Bibi Nanni*, or, "the Lady Nanee." Hindus also resort to them, and each claim the shrine or Zearat as peculiarly his own. The most celebrated of these is at Hingohl, as called by the natives, (the Hinglazz I believe of our maps,) on the coast of Lus, in Belochistan, near the junction of the Puralli river with the sea. Another famous shrine of *Bibi Nanni* is on the river Bolan, in the pass leading from the Dusht Bedoulet to Kypta—two or three are in the vicinity of Kabul. I am not sure whether the Hindus do not refer these shrines to their deity PARBATI. If NANAIA should have been the distinctive epithet applied to any of the Greek female deities or nymphs, she will be identified with the Hindu deity PARBATI, or the one whose shrine is visited at llingohl, &c., and the Muhammedans in NANNI, may have preserved the Greek name NANAIA.

Fig. 2, *Obverse.* Figure of prince sacrificing on altar. Legend Greek, BACΙΛΕVC BACΙΛΕΩΝ KANHPKOT

*Reverse.* Female figure standing to the left, in her front four-pronged symbol. Legend Greek ΗΛΙΟC.

This is one from fourteen copper coins in my possession of the same type, the legend proves them of the same princes as the former coins considered. The

legend ΗΙΟC in Greek signifying the sun, the figure may be considered a priestess of PHÆBUS or APOLLO.

Fig. 3, *Obverse.* Prince sacrificing on altar, legend corrupted Greek.

*Reverse.* Figure standing to the left, with wreath in right-hand. Legend corrupted, illegible Greek.

Fig. 4, *Obverse.* Prince sacrificing on altar. Legend Greek.

*Reverse.* Figure standing to the left. Legend Greek.

These are two from twenty-two copper coins of the same size and similar types: they have an evident connection, notwithstanding the legends appear to vary. They are too obscure to allow me to attempt to decipher them until I have perfect leisure.

Fig. 5, *Obverse.* Prince sacrificing on altar.

*Reverse.* Figure in a running or dancing attitude.

This is one from six copper coins of the same size and type in my possession. This species is easily distinguished by the Bacchanalian, (it may be inspired,) posture of the figure on the obverse.

Fig. 6, *Obverse.* Prince standing.

*Reverse.* Figure standing to the right. Legend corrupt Greek—may be intended for NANAIA.

Fig. 7, *Obverse.* Prince standing.

*Reverse.* Figure standing to the left. Legend corrupted Greek—may be intended for ΗΙΟC.

These are two from sixteen copper coins of same size and similar types in my possession. I have introduced them into this series, of which the coins of KANERKOS take the lead, notwithstanding the omission of the altar, as they agree in one grand feature marking this series, viz., of the prince standing on the obverse, and of a figure or deity standing on the reverse; if my conjectural reading of the legends be admitted, they should follow the coins of KANERKOS, or they may even belong to him.

#### Series No. 2.

Fig. 8, *Obverse.* Prince standing and sacrificing on an altar, a club or other emblem to his right; also a four-pronged symbol to his left, a tridental staff, the symbol of majesty. Legend Greek, portion legible, BACΙΑΕVC BACΙΑΕV.....ΟΟΗΚΑΔΦΙCHC.

*Reverse.* Female figure standing by cow, which looks to the right. Legend Pehlevi, but obliterated.

Fig. 9, *Obverse.* As preceding. Legend Greek, BACΙΑΕVC BACΙΑΕWN ΣΩΤΗΡΗΕΓΑC ΟΟΗ ΚΑΔΦΙCHC.

*Reverse.* As preceding. Pehlevi, legend more distinct.

Figure 8, is one of eight, and Fig. 9, one of twenty-nine copper coins of similar sizes and types in my possession. Happily the legend is clear, and happily we are able to announce that the king of kings KADPHISES was buried at Kabul, where his sepulchral monument was opened by M. MARTIN, and one of his gold medals extracted, a representation of which is given as a supplementary coin. The word ΣΩΤΗΡΗΕΓΑC occurring on the legends, somewhat perplexes me\*: the letters ΟΟΗ, if the era, and denoting 800, may be of some importance, as it may be Budhist, and that of SAKYA; if the era of GOUTAMA be loosely taken at 600 A.C. that of KADPHISES will be about 200 A. D. Now of Greek princes who must have ruled in these countries before him, and subsequent to a known epoch, that of the overthrow of the

\* It is evidently σωτηρ μεγας again.—ED.

Bactrian monarchy, about 130 A. C. we have the coins of at least fifteen, without reckoning unappropriated ones—and if we suppose KANERKOS to be KANISKA, and that he and his image preceded KADPHISES, we have three if not four princes here; allowing upon an average fifteen years for the reign of each of the nineteen princes we have a total of two hundred and eighty-five years, which calculating from 130 B. C. brings us to 155 A. D.: the remaining 45 years may very readily be granted to unidentified Greek princes, and we shall have fair grounds for presuming the era HOO to be that of SAKYA, and that KADPHISES reigned at Kabul about 200 A. D.

Figs. 10, 11, & 12, *Obverses*. Princes sacrificing on altars. Legends corrupt Greek.

*Reverses.* Figure standing before cow, which looks to the left.

These are three from two hundred and fifty-four copper coins of various sizes but similar types in my possession. I have not leisure to note all the observations which arise from a consideration of these coins. That they refer to the series of KANERKOS and KADPHISES is evident from the presence of the altars, and if they be Indo-Scythic, so are also these. While I so far agree with SCHLEGEL and Col. TOP, I must differ from them in considering the figures on the reverses to represent "SIVA and his hull NANDI." I know not what the hull may be, but the figure is certainly female. These are the most numerous types of coins found in these countries. I think it probable they may be ultimately found to include those of several princes. They vary in point of execution from tolerable to wretched; the earliest specimens, such as fig. 10, are of fair workmanship.

*Series No. 3.*

Figs. 13, 14, 15, 16, 17, & 18, *Obverses*. Princes standing. Legends corrupt Greek.

*Reverses.* Figures on elephants. Legends corrupt Greek.

These are six specimens from fifty-six copper coins of similar sizes and types in my possession. The elephant on the reverse of these coins renders them easily recognizable. On these coins, although the costume and attitude of the princes are essentially the same with those of the two preceding series, yet the absence of the altars suffices to arrange them distinctly—the legends appear to vary, but I think there can be little doubt but that the characters are intended for Greek. On the coins of this and the other Indo-Scythic series the exclusion of Pehlevi will be noted—the tridental staff and four-pronged symbol are continued on this and the succeeding coins to be noticed.

Figs. 19, 20, & 21, *Obverse*. Princes standing.

*Reverse.* Female figure seating on throne (?).

These are three from fifty-six copper coins of various sizes and similar types in my possession—these coins evidently refer to the same line of princes as the former; and the legends are as manifestly intended for Greek.

Fig. 22, *Obverse*. Prince standing.

*Reverse.* Sitting female deity on clouds (?).

This is one from six copper coins of similar size and type in my possession.

Fig. 23, *Obverse*. Princes standing.

*Reverse.* Female deity on throne, circles of glory around her feet.

This is one from one hundred and thirteen copper coins of similar type in my possession. These coins, although so numerously found, afford no specimens more perfect or intelligible than the one here represented, which will suffice to give a fair idea of the type.

I have no doubt but all these coins will be ultimately deciphered; at present the reverses enable us to note four distinct sets, it may be they will have to be subdivided hereafter.

CLASS GREECAN. Series 1<sup>st</sup>

## Coins of the recorded Kings of Bactria

## Menander the Saviour.

Fig. 1.



Fig. 4.

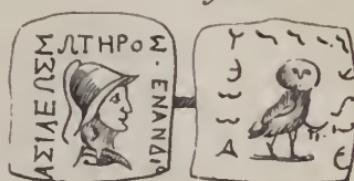


Fig. 2.



Fig. 3.

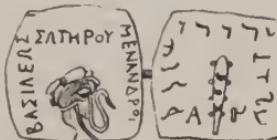


Fig. 5.



Fig. 6.

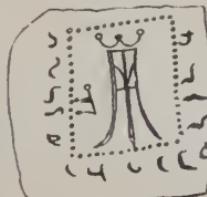
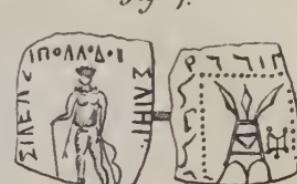


Fig. 7.



## Eucratides the Great.

Fig. 8.



Fig. 9.



Fig. 10.

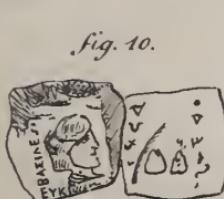


Fig. 11.





CLASS. Grecian Series 2.

Antilakides.

Fig. 13.



Fig. 14.

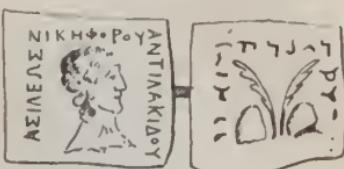


Fig. 15.



Ausius.

Fig. 16.



Series 3.

Agathocles, &c.

Fig. 17.



Fig. 18.



Fig. 19.



Series 4. *Coins of the Greek Nysian Kings.*

ΕΡΜΑΙΟΥ.

Fig. 20.

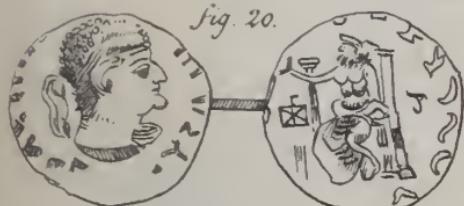


Fig. 21.



ΕΡΜΑΙΟΥ.

Fig. 22.



Fig. 23.





CLASS GRECIAN Series 4.  
Coins of the Greek Nysian Kings.

ΕΡΜΑΙΟΥ.



Fig. 24.



Fig. 25.



Fig. 26.



ΗΕΡΑΣ

Fig. 27.



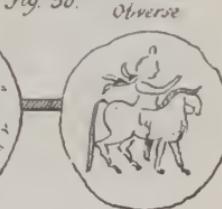
Fig. 28.



Fig. 29.



Reverse



Obverse

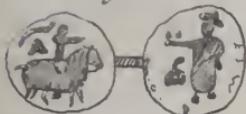
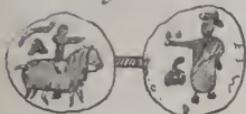


Fig. 30.



Fig. 31.



Series 5.

ΥΝΑΔΦΕΡΡΟΥ

Fig. 34.



Fig. 35.



Fig. 36.



Fig. 37.





## CLASS GREECAN. Series 5.

## Coins unidenitified

fig. 38.



fig. 39.



fig. 40.

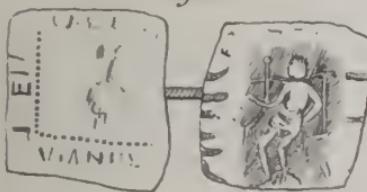


fig. 41.



fig. 42.

## Supplementary Greek Coins.



fig. 43.

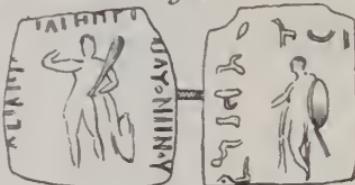


fig. 44.

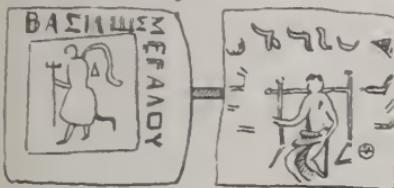


fig. 45.



fig. 46.

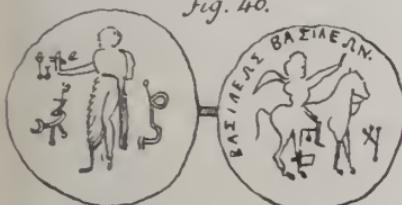


fig. 47.



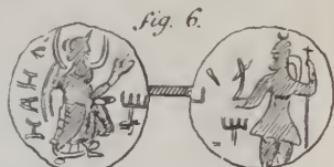
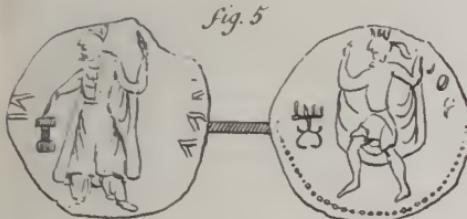
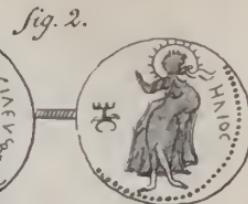
fig. 48.



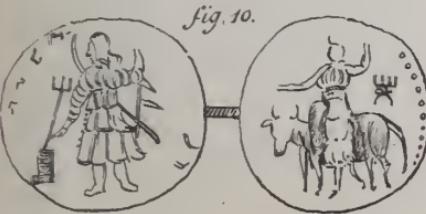


## CLASS INDO-SCYTHIC. Series 1.

Coins of ΧΑΝΗΡΚΟΥ &amp;c

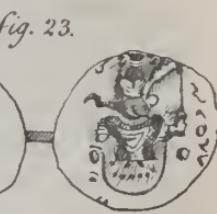
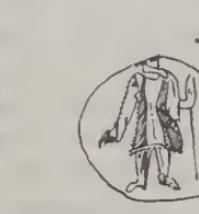
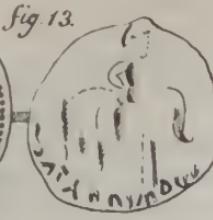


## Series 2. Coins of ΚΑΔΦΙΣΗ &amp;c





## CLASS INDO-SCYTHIC Series 3.



## Supplementary Gold Medal of ΚΑΔΦΙΧΗ.

Fig. 24.





## Supplementary Indo-Scythic Coins.

Fig. 24, *Obverse.* Bust. Greek legend ΒΑΣΙΛΕΥC ΟΟH MV ΚΑΔΦΙCHC

*Reverse.* Standing figure, naked, with three tails; staff in right-hand—left hand holds a ball—in the left, four-pronged symbol. Legend Pehlevi.

This is a representation of the gold medal found in the sepulchral monument of the king at Kabul—on the legend we have besides OOH—the letters probably MV or MT: if these be also numerals, they may express the years of his reign or of his dynasty.

*Kabul, 28th Nov. 1833.*

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II.—*Journal of a Route from Déra Ghazi Khan, through the Veziri Country, to Kabul. By Dr. Martin Honigberger, in a Letter to Captain C. M. Wade, Pol. Agent at Lúdiána. Plate XIV.*

[Read at the Meeting of the 20th March.]

The annual *kafila* of the *Lohánis* was very late in assembling at *Déra* bend this year. We did not leave that place until the 18th of May, and reached *Kabul* on the 28th of June. The heat of the weather during our journey was excessive. It was greater than that of *Lahor*. In tents the thermometer rose to 38 Reaumur. Several persons perished from the effects of the heat, as well as a horse belonging to me.

It has proved an arduous and fatiguing journey. The road through the hills was extremely difficult, and strewed over with large stones. It was so narrow in some places as not to admit the passage of a loaded camel. They were constantly falling down precipices with their *kaja-was*, and a good deal of property was sacrificed on the road from these accidents. No exertions were made with success at the time to recover it. On reaching the halting place, people were seen complaining in every direction of the loss of something; but those who formed the last part of *kafila* generally collected the property lying on the road, and delivered it to the owners on their arrival.

From the time we entered the hills, until we reached *Demendí*, we were in constant alarm of the *Veziris*. They did not however shew themselves in such force this year as they usually do, yet they did not forego their habitual depredations, and notwithstanding the vigilance of the armed men of our party, who were to be seen flourishing their arms and beating *nakáras* along the line, the *Veziris* succeeded in carrying off several camels. Those that they could not take away, they killed on the spot, and made the best of their way to their fastnesses in the hills.

At night they would descend and visit our camp, when if they found that our guards were not on the alert, they would steal any property that they could lay their hands on. There was no vestige of population where we were infested by these plunderers, and consequently the mer-

chants who frequent this route provide themselves with a stock of provisions sufficient to last them through the *Vezirí* country before their entrance into the hills.

As soon as we had passed the limits of the *Vezirí* tribe, we came in contact with the *Suleiman kheil*, who resemble the *Vezirí*s in their predatory habits, and like them have the virtue not to take the life of their victims. When a man falls into their hands, they strip him of every thing they find about him, and let him go. On the same principle of forbearance, if any of these freebooters fall into the hands of *Lohání*s, they spare his life, but inflict every other kind of injury on him, such as stoning and beating with clubs, pulling off his beard, and setting it on fire. In fact, they use almost every species of torture short of death. On the arrival of a *kafila* among the *Suleiman* tribe, they come and barter ghee, curd, ropes, and such like articles, with the merchants, for clothes, which enables them to see and ascertain the situation of the property belonging to a *kafila*, and as the night falls, and the travellers retire to rest, these pests come to the camp and carry off such things as they have previously marked for their prey.

There is a singular custom among these people: their women form their hair into ringlets, which they throw over their head, so as to cover their eyes, and half of the face; and when these damsels wish to use their eyes, they raise their heads backwards, so as to move these ringlets from the line of sight. The *Lohání* women invariably have a Venetian gold coin suspended on their forehead, and the generality of these people wear black-coloured clothes. Their tents are of the same colour. They speak the Afgháni language, which is very harsh and uncouth, compared with the Persian; but the mercantile part of the tribe, who resort to *Kabul*, *Hindustan*, and *Bokhara*, have a knowledge of Hindustani, Persian, and Turki. Their wives are of great use to them. They share their toils, load their camels, pitch their tents, and perform every other domestic duty. On their journeys they travel in *kajawas* two and two on each camel. During the hot season, these people leave their homes and move towards *Gheznín*, to pass their time in the neighbouring mountains, which possess a cool and temperate climate from their superior elevation. They generally pass two months on this migratory excursion, and remain the rest of the year at *Déra bend*. There may be altogether about one thousand families of these *Lohaní*s, four hundred and fifty of which reside at *Selkhir*, a place which they inherit from their forefathers, and the others live at *Kárá bágh*. They maintain a standing force of two hundred horses, besides a portion of foot soldiers. About one hundred of them separated from us at the fortress of *Kherúti*, and went towards *Kandahar*. They have altogether ten

thousand camels of burden belonging to them, and trade in all the productions of *Hindústán*. Large quantities of indigo are exported annually by them from *Multán*, *Bháwelpur*, *Déra Ghází-Khán*, to *Khorásan* and *Bokhára*. Four lakhs of rupees is the estimated amount of duties which they pay every year to different branches of the *Cabul* Government, according to the following details, viz. two lakhs at *Cabul*, one lakh at *Gheznín*, and one lakh at *Bamián*.

In the course of my journey I intended to have made a collection of scarce botanical specimens, but partly owing to the extreme heat which had parched the vegetation, and partly to the ravages of locusts, I could not collect many, but have obtained a few, which I preserve. I wished very much to visit the *Gúl* mountain, for the purpose of collecting plants. It is said to be remarkable for the richness and variety of its vegetation ; but I was advised not to make the attempt, as the *Hazáras*, to whom the district of *Kárá-búgh* belongs, are in a state of rebellion. The *Hazáras* are a very extraordinary people, and have very uncommon features ; they have little eyes, small noses, and thick ugly lips, with scarcely any beards : those who have any, merely possess a few scanty hairs.

When I was leaving *Déra Ghází-Khán* and *Damán*, the people had reaped their spring crops. On arriving midway at *Gheznín*, I was surprised to find that the grain had only just begun to spring up. In *Damán*, the thermometer stood at 38 Reaumur, and on ascending the range which forms the proper limit of *Khorásan* in this direction, it fell to 27, which is nearly as cold as *Simla*. The difference in the climate of the two places is distinguished by a great change in their vegetable productions. The sugar-cane, which grows at *Damán*, is not produced here. On approaching *Khorásan*, we began to feed our camels on a herb which is called “*turk*,” produced in abundance in this quarter.

There has been an extraordinary fall of snow this year in *Cabul*. The oldest inhabitants of the city do not remember ever having witnessed such a severe winter. On the 5th of June, the thermometer at *Cabul* ranged from 15° to 25° Reaumur, (66° to 89° Fahr.)

It was my intention on my arrival at this place to accompany a *káfila*, bound to *Bokhára*, which was ready to start the next day, but Nawáb JABBAR KHAN would not let me depart without spending some days with him. He informed me that BEDERUDDIN, the great merchant who conducts the trade between *Cábul* and *Bokhára*, would set out for *Turkistán* in a short time, and I could proceed with him. I have accordingly deferred my departure.

There is an European here by name MASSON. He was several years in the Punjab. It appears that he has also been to *Tabriz*, and has lately come to *Cabul* by the way of *Belochistán* ; he resided some time at *Bami-*

an, where he amused himself in making excavations, and has succeeded in finding several idols. At *Cabul*, he has been engaged in the same kind of pursuit, and has been rewarded here also by his discovery of several idols quite entire. Among his discoveries is an inscription on a piece of paper made of the leaf of a tree, but which unhappily is so worm eaten and injured by the lapse of time as not to be legible.

The recommendatory letter which you wrote to SYED KERAMET ALI, respecting me, has been delivered to him ; he frequently visits me, and shews me every attention in his power. A *káfila* from *Bokhara* is expected here either to-day or to-morrow. Nawab JABBAR KHAN is very anxious to procure some platina, for making experiments in alchemy ; the mysteries of which, the credulous natives of this country labour in vain to discover.

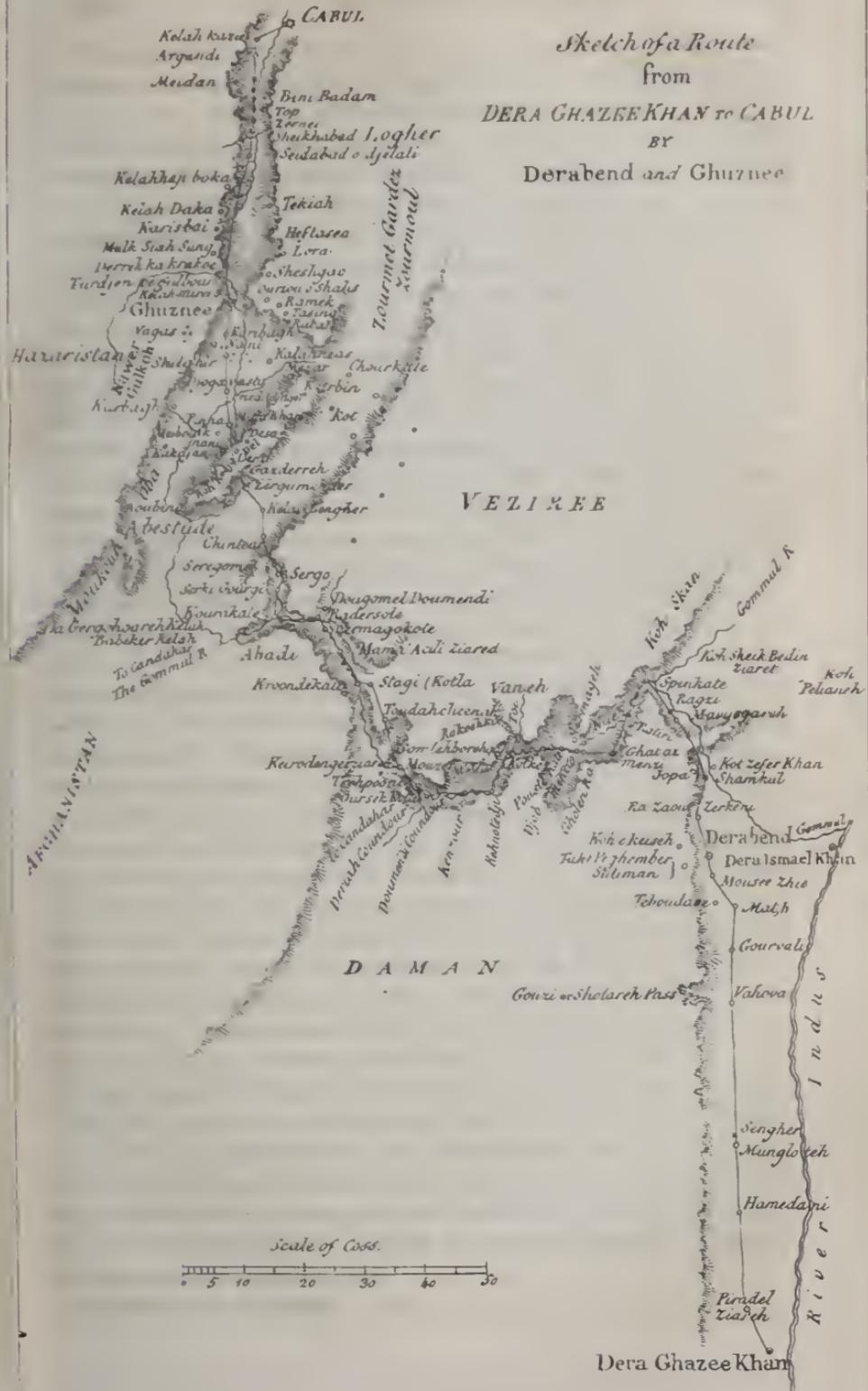
I send you herewith a rough map of the country lying between *Cabul* and *Déra Ghází-Khán*, which we traversed, and hope that it will be acceptable, notwithstanding its imperfect execution from my want of skill as a draughtsman. (See the accompanying Plate.)

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III.—*On the Aptitude of the Himalayan Range for the Culture of the Tea Plant.* By Dr. H. Falconer, Supt. of the H. C. Bot. Garden, Sehārunpur.

[Extracted from a Letter to G. J. Gordon, Esq. Secretary to Committee of Tea Culture.]

The most productive tea districts in China, according to all accounts, lie in the maritime provinces of *Fokien*, *Kyanti*, and *Kyang-nau*, chiefly between  $27^{\circ} 30'$  and  $31^{\circ}$  N. lat. and long.  $112^{\circ}$  to  $117^{\circ}$ . One kind, *Lungau-cha* (a superior sort of *Hyson*) is said by the Jesuit missionaries to be produced so high north as  $38^{\circ}$  and E. long  $100^{\circ}$ , and another, *Paeul-cha*, brought from the province of *Yunnan*, is said to be procured from mountains in the lat. of  $25^{\circ}$  on the frontiers of *Ava* and *Pegu*. The tea plant is grown on the sloping sides of mountains or in valleys, but chiefly at the foot of mountains. It is also produced in level tracts, but less advantageously. Besides the explicit information given by Dr. ABEL, from actual examination of one district, it is sufficiently certain that the rock formations in most of the tea districts, are chiefly primary, from their being productive of metals which are only found in such formations. The best tea soils are said to be light, gravelly, sandy, and whitish (*blanchatre* in *DUNALDE*, probably calcareous), with little accumulation of vegetable mould. LE COMTE says, the best Tea is produced in a gravelly soil, the next best in a light or sandy soil, and the inferior in a yellow (*jaune*, probably clayey) soil. It is admitted on all hands that the teaplant thrives best with an open exposure to the south.





The climate of the whole of China is remarkable in respect of temperature, and it must be duly weighed when the acclimatization of any of its peculiar vegetable productions in another country is concerned. Latitude alone is here no guide, the mean annual heat being much under what is observed in most other countries at an equal distance from the equator. Pekin, lat.  $39^{\circ} 54'$ , nearly at the level of the sea, has a mean annual temperature of  $54.86$ ; calculated for the latitude theoretically by a formula\* of very general application for the distribution of heat according to latitude without reference to other modifying causes, we get  $62^{\circ} 5'$ ;—a difference of about  $7^{\circ}.5$  above the observed mean temperature of the year. But it is in the excesses of the summer and winter seasons that the climate is most remarkable. It has a winter temperature of  $26^{\circ}.42$ , or nearly that of Upsal in lat.  $59^{\circ} 51'$  ( $20^{\circ}$  further north) and a summer heat of  $82^{\circ}.58$ . Its winter climate is that of Copenhagen, and its summer heats are as scorching as at Cairo. Between the mean temperature of the hottest month in summer and the coldest of winter, there is a difference of not less than  $59^{\circ}$  of Fahr., a climate of excesses almost without parallel in any part of the globe except Quebec in Canada. This condition, which is owing to the vast accumulation of land, extending from the arctic pole on through eastern Asia to China, is not confined to the northern provinces. It extends to Canton within the tropic, but modified there by the equalizing effect of a now tropical ocean about it. The mean annual heat of Canton, lat.  $22^{\circ} 10'$ , calculated theoretically for this latitude, gives  $75^{\circ}.5$ , Fahr.; reduced from a register in the Transactions of the Medical Society of Calcutta, the observed mean temperature is  $73^{\circ}$  nearly. The mean of the coldest winter month is  $54^{\circ}$ ; of the hottest summer month  $85^{\circ}.5$ . I am not aware that any determination has been made of the climate in the provinces between Pekin and Canton, and I have not access to the later writers on China. But an approximation may be made to the temperature of the tea districts from the facts known regarding Pekin and Canton. Assuming that the most productive tea districts extend from  $27^{\circ}$  to  $31^{\circ}$  N. lat. and taking  $29^{\circ}$  as the central tract, by calculation for this latitude we get  $71^{\circ}$  Fahr. for the mean annual heat at the level of the sea. Assuming further, that the refrigerating influences on the climate of China, which have been seen to be  $7^{\circ}.5$  at Pekin and  $2^{\circ}.5$  at Canton, amount to  $5^{\circ}$  Fahr. in the parallel of  $29^{\circ}$  lat., and deducting this from  $71^{\circ}$ , we get  $66^{\circ}$  for the mean annual temperature. The elevation of the tracts of tea cultivation above the sea will form another abatement on this sum. But on this point I have no grounds to form any thing like a precise

\* Mean temperature =  $81 \cos. \text{Lat.}$

† Vol 6th, by Mr. PEARSON.

conclusion. It is stated by DUHALDE that the tract from which one of the finest green teas, *Song-lo-cha*, is brought is a mountain in the district of *Whey-choo-foo* of the province *Kyang-nau*, of no great height or extent (peu de hauteur et d'étendue). Supposing that the Tea cultivation reaches the height of 3000 feet above the sea, and making a reduction for this altitude, the resulting mean temperature might be a range of 56° to 64°. What the range of temperature between the cold of winter and the heat of summer is, it may be difficult to say. The heat of summer cannot be less than at Pekin, which is 10° higher north: and it has been seen that the difference between a summer and a winter month at Canton within the tropic is 30°, while at Pekin N. lat. 40°, it is 59° Fahr.; it may therefore be assumed that in the lat. of 28° the range of the thermometer from the mean of summer to that of winter is not less than 40° Fahr.

In regard to the moisture of the climate, there is little precise information, and what is known is chiefly as confined to Canton. The rains are not regularly periodical, as is the case on this side of the continent of Asia, within the same parallels; rain seems to fall all months of the year, although heaviest from August till October. The mean fall of rain, as entered in the above quoted Canton register, is for 1829, 42 inches; 1830, 50 inches; 1831, 70 inches. Average of the three years 56 inches. In the tea districts the quantity must be less, excepting at the greater elevations. At the northern limit, snow falls abundantly during the winter. At the southern limit, in the province of Canton, where large quantities of the inferior teas are produced, snow is never seen. It is probable that it falls occasionally in the centre districts on the higher elevations.

The circumstances of climate therefore, in regard of temperature and moisture, under which the tea plant is cultivated in China, may be stated thus: that the tea is produced, over an extent of country where the mean annual heat ranges from 73° to 54° 5' Fahr.: where the heat of summer does not descend below 80°, and the cold of winter ranges from 54° to 26°; where the difference between summer and winter heat is on the northern limit 59°, and on the southern 30° Fahr.; that it is cultivated in highest perfection where the mean annual heat ranges from 56° to 64°. That rain falls in all months of the year, and that the moisture of the climate is on the whole moderate.

The foregoing remarks will apply in a great measure to Japan, in some parts of which excellent teas are produced. Without entering on details, it may be sufficient to say, that at *Nangosa-ki* the mean temperature of the year is 60°.8; the greatest observed heat in summer, 98°; the temperature of January, the coldest month, 35°; that rain falls

periodically about mid-summer ; that in the higher parts of the country heavy snow falls in winter, with intense frost ; that the mean temperature of the summer is 83°, and that of winter, 39°.

It may now be worth considering the countries into which the tea plant has been introduced and failed.

At Penang, close to the line, with a mean annual heat of 80°, and equable climate the whole year round, and an excessive fall of rain, amounting to nearly 80 inches for the year ; the climate is in every respect so much in contrast with that of China, that the tea could not be expected to be grown. The same is the case with St. Helena, where although the mean heat for the year is 73°, the thermometer does not fall in winter below 55°, and the climate is moist and cloudy. Of the causes of failure in Java I am less able to judge, but they are likely to be found in its low latitude, 6° 9', the excessive moistness of the climate, and the great fall of rain during the year. At Rio Janeiro, tea was tried under a colony of Chinese, and failed, perhaps from being within the tropic, and its too great heat, with a moist and generally equable climate. It has been twice attempted by the French in the Carribee Islands. The first occasion in Martinique was a failure. I do not know the result of the second, but a lat. any where between 11° and 19°, with the kind of climate consequently implied, gives little chance of success.

There is perhaps no part of the Company's territories in India which supplies all the conditions of the tea districts of China, in respect of climate. But there are situations which approach it so nearly, as strongly to bear out the conclusion, that tea may be so successfully produced in this country as to be an object of high commercial importance. It appears to me that this can be expected in no part of the plains of India. The mean annual heat of the climate from 30° N. down to the parallel of Calcutta, is much beyond that of the tea cultivation in China. We have in addition to an excessive summer heat, with either hot winds or a close scorching air during the day, a barely temperate winter cold, and heavy periodical rains. We certainly get some Chinese fruits, such as the lechee, the loquat, and the wampee to grow, but the tea plant appears to require a greater cold to thrive in. It has been seen that the annual heat of the southern limit of tea cultivation in China, assumed to extend to Canton, is 73°\* Fahr. At Sehárunpur, which may be considered as at the *northern* limit nearly of the plains of Hindustan, 8° of lat. higher and 1000 ft. above the sea, the mean temperature of the year is 75° Fahr. ; the temperature of June, is 90°, and of January, 52°.

\* At the level of the sea.

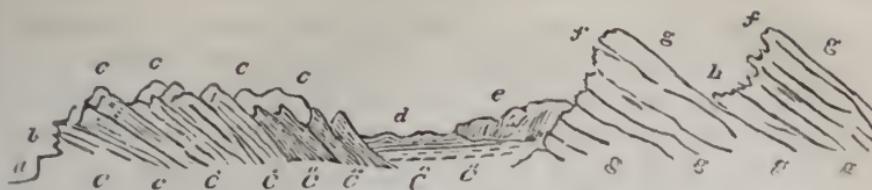
As we go south towards Calcutta, the temperature increases, although not uniformly, as may be seen from the observed heat of

Puttygurh, Benares, Ghazipur, and Calcutta.

77°. 5      77°. 81      77°. 36      78°. 3

In the Himalaya mountains, the case is widely different : excepting periodical rains, all the conditions of a temperate climate are here found, and, here above all parts of India, we may look for the successful cultivation of tea. Our not possessing mountain territory below 29° may alone exclude the consideration of the fitness of the southern tracts. My personal knowledge of the hills is chiefly confined to the tract between the Ganges and Jumna. In consequence of being tied to Scháranpur, from having the medical duties of the station to attend to, in addition to the Botanic Garden, I have not been able hitherto to see much of the mountains : but, as the rock formations and the configuration of the hills are the same along an immense tract, the remarks which I have to make will apply very generally to the hills.

The Himalayas have a direction running from N. W. to S. E. They consist, on this side of the snowy range, chiefly of primary rocks, inclined at a considerable angle. The dip of the strata is to the E. of N. and their abutment to the W. of S. On the flank of the great range there is a line of low hills, the Sewálik, which commence at Roopur, on the Satléj, and run down a long way to the south, skirting the great chain. In some places they run up to, and rise upon, the Himalayas ; in others, as in this neighbourhood, they are separated by an intermediate valley. Between the Jumna and Ganges they attain their greatest height, which Captain HERBERT estimates at 2000 feet above the plains at their foot ; or 3000 above the sea. Scháranpur is about 1000 feet above the sea. About 25 miles north are the Sewálik hills. They are here about six or seven miles wide. To the east of the Ganges and west of the Jumna, they gradually fall off. They have the same direction with the great chain, and agree generally in dip ; their slope being towards the north and abutment to the south. They rise at once against the plains, with an abrupt mural front. They are serrated across their direction, forming a succession of scarcely parallel ridges, with a steep face on one side, and slope on the other. The strata are inclined at an angle of 25° to 30°. They are of recent tertiary or alluvial formation, and consist of friable sandstone or gravelly conglomerate, agglutinated by a calcareous cement, containing subordinate beds of clay : the upper strata are entirely gravel. Beyond these hills lies the valley of Dehra, 1200 or 1400 feet above the sea, and then the great chain of the Himalayas. The following rude sketch will perhaps give you an idea of the whole better than description ; the distances are not in proportion in the section.



(a) level of the sea at Calcutta ; (b) level of Seháranpur, 1000 feet above the sea ; (cc) the Sewálik hills ; (c'c') the strata of sandstone and conglomerate ; (c''c'') strata of gravel ; (dd) the valley of Déhra ; (ee) strata of the Sewálik hills, in some places rising on the Himálayas ; (ff) outer ridges of the Himálayas ; (gg) primary strata ; (h) the valleys or hollows between the ridges.

I regard these hills as an upheaved portion of the plains at the foot of the Himálayas, and that they are formed of the debris of the mountains washed down by streams, and other natural causes. They are covered with vast forests of saul, toon, and fir, and are uninhabited.

The soil of the Scwálik hills and of the valley of Dehra takes the character of the rocks. It is dry sandy or gravelly, with a considerable quantity of calcareous matter, and it appears to me to possess the character indicated for the tea districts in China.

The great chain of the Himálayas rises in a ridge with an abrupt steep face against the plains of about 6000 feet in height ; there is then a slope from the crest of the ridge towards the north. This is the general character of the Himálayas : the mountains on the side of the snowy range consist of a series of nearly parallel ridges, with intermediate valleys or hollows. They throw off spurs in all directions into the hollows, forming subordinate valleys. There is nothing like table-land (perhaps in the whole of the mountains, with the exception of Nipal), and the valleys are rather broad, wedge-shaped chasms, contracted at the bottom to a mere water-course, than any thing else ; in fact, the ridges and intermediate valleys, as a general law, form a series of salient and re-entrant angles, as seen in the sketch. In consequence the quantity of level or nearly level ground to be met with is most inconsiderable. From the dip or slope being towards the north, and the abutment to the south steep, the great mass of vegetation has a northern exposure, and the southern faces of the mountains are generally naked.

The formations are primary ; the first towards the plains consist of vast strata of limestone, lying on clay-slate, crowned by slate, greywacke, or sandstone. Beyond the limestone tract, gneiss, clay-slate, and other schistose rocks occur. Granite, so far as I know, is not found in the outer ridges. It occurs in the mountains nearer the snowy range. I have not gone that length, and have not yet seen granite *in situ*. The igneous rocks, which have been concerned in the upheavement of the outer tracts, are of the green-stone trap series, and are very generally met with in

dykes intersecting and rising through the regular strata. The formations have a remarkable feature :—the strata are in all directions fractured or comminuted: the slaty rocks are broken into small fragments, as if they had been crushed; and the limestone rocks are vesicular or cavernous, and broken up into masses.

The arrangement and nature of the soil take their character from the rocks. From the high angle at which the latter are inclined, and the northern direction of the slope, the soil is chiefly accumulated on the northern sides, where is also the vegetation. From the prevalence of schistose strata, and limestone, the soil under-lying the vegetable mould is clayey and calcareous, or limestone gravel. There is little sandy soil, or sandy gravel. From the extreme richness of the vegetation undisturbed for ages, and the moisture of the climate, there is usually a great accumulation, on the northern slopes, of vegetable mould; on the southern faces, the great steepness leaves little room for the accumulation of soil; where it occurs, it is in patches, and consists of clays or limestone gravel, mixed up with vegetable mould. There is here also little sandy soil. Towards the crest of the slopes, the soil is usually dry, from the moisture running speedily off; but lower down, and wherever the ground is tolerably level, the soil is quite damp, and perhaps it is rarely dry in the most parching seasons.

Cultivation is laborious and difficult. From the absence of table-land, and the angular and contracted shape of the bottom of the valleys, there is little or no level ground. The most favorable slope is taken, and besides the usual tilling of the ground, it has to be divided into patches, which are built up into inconsiderable terraces, rising the one above the other like the steps of a stair. These circumstances might make the cultivation of tea scattered, and prevent it from being produced in any great quantity on one spot.

The climate of the Himalayas is decidedly damp. The periodical rains commence about the middle of June, and continue till the end of September. They are greatly heavier than in the neighbouring plains, and continue at times for many days without intermission; occasional rains occur in most months during the year. The mean annual fall has been estimated by Mr. TRAILL, Commissioner of Kumaon, at Hewálbágh, near Almora, about 4000 feet above the sea, and lat.  $29^{\circ} 30'$ , at from 40 to 50 inches. But this I imagine is too little. From the middle of November, till the end of February, occasional falls of heavy snow take place, down to the level of 6000 feet above the sea; on the outer ridge of the mountains, and lower down within the hills, perhaps to 3500 feet. It is a great cause of the richness of vegetation and dampness of soil. In the poorer tracts (such as the district of Jounsar) if snow does not fall during the winter, the subsequent crop invariably fails.

From the end of February till the middle of June, and from October till the middle of November, the sky is generally clear and unclouded. During these months, in consequence, very heavy dew is deposited during the night: so that as a general fact, it may be stated, what with rain, snow, and dew, that moisture in one shape or other falls abundantly, every unclouded day during the year: and the cloudy days without rain do not amount to a month in the year.

In respect of heat the climate of the Himálayas, lat.  $29^{\circ} 30'$ , at an altitude of 4000 feet above the sea, is temperate; the hot winds cease, and the vegetation takes on a European character. In those parts of the mountains, such as Masúri, where the outermost ridge rises at once from the plains to the height of 5000 or 6000 feet, the climate is perhaps equal to any thing known. About three hours after sun-rise, the heated air of the Dún or valley, particularly during the hot months, rises and establishes a current upwards. It gets rarefied, and consequently cooled, and causes a cool fresh breeze across the hills towards the interior, which diminishes the effects of intense solar radiation at this season. It is as regular as the sea-breeze of a tropical island. At Masúri, 6000 to 7000 feet above the sea, the mean annual heat is  $57^{\circ}$ ; the hottest months June and July, have a mean temperature of  $67^{\circ}$ ; the coldest months are December and January, the mean heat of January is  $42^{\circ}$ . At Hawulbagh, below Almora, nearly 4000 feet above the sea, the mean temperature for the year, deduced from Mr. T RAILL'S\* register, is  $60^{\circ}$ ; that of January is  $41^{\circ}$ , and of July,  $70^{\circ}$ , giving a range of  $39^{\circ}$  between the coldest and hottest months of the year. Between the temperature at 7 A. M. in January and 2 P. M. in July, there is a difference of  $53^{\circ}$ . On one occasion, the thermometer stood at  $18^{\circ}$ , shewing a range of not less than  $60^{\circ}$  between the greatest observed extremes of summer and winter.

In the valley of Dehra, according to the Honorable Mr. SHORE, the mean temperature of the year is about  $70^{\circ}.5$ . The mean of the hottest month is  $84^{\circ}$ , and of the coldest  $53^{\circ}.2$ . The greatest observed heat was in June  $101^{\circ}$ , and the maximum cold was in January  $37^{\circ}.7$ . The greatest range of temperature in a month was in April, the maximum being  $93^{\circ}$ , and the minimum  $53^{\circ}$ , a difference of  $40^{\circ}$ ; the least range was in August, the maximum being  $90^{\circ}$  and the minimum  $72^{\circ}$ , a difference of  $18^{\circ}$ . The extreme difference for the year was  $63^{\circ}.2$ ; shewing one of the most "excessive" climates known. Speaking generally, it may be stated of the Dún, that the cold weather commences earlier, and lasts longer than in the plains in the neighbourhood; and that the cold of winter is greater: that the hot winds of the plains are shut out by the Sewálík lower hills, on the S. W. of the valley. A partially hot wind is at times felt, but the European residents do not use tatties for

\* *Transactions, Asiatic Society, vol. xvi.*

refrigeration. No register of the fall of rain, so far as I know, has been kept, but it may be said that more falls than on the plains near the Dún, and less than on the mountains above it. According to Mr. SHORE, the average of three years was 112 rainy days in 365. The climate is decidedly damp, and remarkably so in contrast with the plains. This is a necessary consequence, from its situation between the Himalayan mountains and the Sewálik Hills, and from the great quantity of jungle with which it is still covered. In the hot winds, on entering the Dún, after leaving the parched and withered aridity of the plains, the eye is filled with a refreshing vista of luxuriant verdure. Parasitical orchideæ or air plants, which require a combination of great moisture and heat to thrive in, cover the trees in the greatest profusion: while at Seháranpur, they are kept with difficulty alive, under a constant supply of artificially afforded moisture. Very rarely, perhaps once or twice in the memory of man, snow falls in the Dún. Mr. SHORE records an event of this kind as having occurred in Feb. 1814.

From what has been mentioned above, it appears to me that there is a great similarity between the climate of the tea districts of China, and that of the lower heights, or the outer ridges of the Himalayas, in the parallel of 29°30'. The chief difference is perhaps more moisture in this country. How extensive a range of temperature may be had will be seen by collating in a tabular form, the temperature of four places already given, as below :

	Annual mean heat.	Summer heat.	Winter heat.
Seháranpur, 1000 feet above the sea, plains, .	73°	90°	52°.
Dehra valley, 12 to 1400 feet do. Himalayas,	70°.5	84	53?
Hawulbagh, 3887 feet do.	60	70	41
Masúri, 6500 feet do.	57	67	42

By varying the altitude the temperature could be graduated to any point that might be desirable, and as temperature is the mean condition, I am of opinion that tea might successfully be cultivated in this part of India. It is an experiment which can be conducted properly only by a Government. On an extensive scale, the risk would be too great for private speculation, and on a small one, the advantage too inconsiderable. There remains now to consider what situation is best adapted for a trial. Besides fitness of climate, there are other circumstances to be taken into account as affecting a favorable experiment:—such as abundance and cost of labor, facility of communication, and distance from the plains.

Three stations in the mountains within the Company's territories might be thought of, Almora, Subáthu, and Masúri. The hills about Almora, although favorable enough in climate, are separated from the plains by a broad belt of Teráí, which is only passable at certain seasons of the year: and it is so unhealthy as to be unsafe at all times to pass through. The population in the neighbouring hills is scanty, and a great portion of the Teráí is uninhabited. Were the tea cultivated, be-

sides a permanent establishment, at the season of gathering, a number of additional hands would be required, which could only be advantageously provided where labour was plentiful and cheap. On these accounts, I am inclined to think, that Almora would not be an eligible district to make a trial in.

Of Subáthu I cannot speak from personal observation, but I imagine it would be a good situation. It is immediately over the plains. There is some level ground about it; there is no Teráijungle in front of it, and the country at the foot of the mountain is inhabited. The valley of Pinjór, in the neighbourhood, is populous. The climate is like that of corresponding heights on the hills north of the Dún.

I am inclined to think the best ground would be near Masúri on the hills north of the Dún. The district lies between the Jumna and Ganges, which are navigable till within a few marches from the foot of the hills. The communication with the plains is open almost all months of the year, and the valley of the Dún is inhabited. There might be had here within a short distance a great variety of situations in respect of soil, climate, and exposure. I imagine that the best position would be a tract on the southern face of the outermost ridge, situated from 3000 to 6000 feet above the sea, or where the hot winds cease, up to the limit of winter snow. On the northern slope, it should be at a lower level, and perhaps here the finer sorts of tea might be produced. The valley of the Dún has a gravelly or sandy soil, which appears closely to resemble what is described as best for the tea cultivation in China, and the climate is such that it is probable that the inferior kinds of tea, such as are grown in the province of Canton, forming perhaps a large proportion of the article exported to Europe, if not superior teas, might be produced in it. In some places, as at Nahu, the rocks and soil of the Sewálik hill formation rise upon the Himálayas to the height of 3000 feet, and in situations of this sort all the most favorable conditions of soil and climate are combined.

I shall conclude by stating compendiously the opinions in this letter:

1. That the tea plant may be successfully cultivated in India.
2. That this can be expected no where in the plains from 30° N. down to Calcutta.
3. That in the Himálaya mountains, near the parallel of 30° N. notwithstanding some circumstances of soil and moisture of climate, the tea plant may be cultivated with great prospect of success; that a climate here may be found similar in respect of temperature to the tea countries in China; that in the direction and great slope of the hills, the absence of table-land or elevated valleys, and the contracted figure of the existing valleys, are the chief difficulties in the way of cultivation, which may prevent tea from being produced in great quantity on any one spot.

4. That the most favourable ground for a trial is a tract on the outer ridges, extending from 3000 feet above the sea, or the point where the hot winds cease, up to the limit of winter snow.

5. That in the valley called the Dêhra Dûn, if not the better, the inferior sorts of tea might be produced.

IV.—*On the Efflorescence of Khârî Nûn, or Sulphate of Soda, as found native in the soil of Tirhût and Sarun, in the province of Behar. By Mr. J. Stephenson, Supt. H. C. Saltpetre Factories, &c.*

The first time I had an opportunity of observing the efflorescence of this salt, took place in the month of January, 1831, between the villages of *Mow* and *Jandaha*, in *Tirhût*. I was travelling between the first place and *Singhea*, a distance of 40 miles. It being night time, and my bearers having stopped to refresh themselves, I looked around and was surprised to find the ground covered white in all directions. Being then a stranger to this part of the country, and the weather very cold, I thought the white appearance might be caused by frost rind\*, or a shower of snow; but on further examination, I found it to be an efflorescence of saline matter, covering the earth to the depth (in some places) of a quarter of an inch. In a few minutes, I collected a sufficient quantity for future examination, and I subsequently subjected the same to analysis. The result I found as follows :

*Examination by tests.*

Litmus test paper, .....	No change.
Turneric do. .....	Do. do.
Oxalic acid, .....	No precipitate.
Prussiate of potass, .....	No change.
Muriate of barytes, .....	Copious precipitate.
Nitrate of silver, .....	Precipitate not very copious.

The two last precipitates being carefully washed, dried, and weighed, gave on the scale of equivalents, a percentage of

Sulphate of soda, .....	58
Muriate of do. .....	22
Insoluble matter, .....	20
	100

Several other samples, which I tried, varied in the quantity of insoluble earthy matter, but very little in the composition of the saline contents. Of course the insoluble matter will vary according to the care taken in collecting the article at the surface of the ground, the upper part of which is the purest.

I have during a three-years' residence had many opportunities of observing (in my frequent journeys in *Tirhût* and *Sarun*) the efflores-

\* A circumstance of no unusual appearance in Behar during the cold season.

cence of this salt, which is in almost inexhaustible abundance during the dry season of this country. The natives collect and manufacture it into a salt called by them *khári nún* (bitter salt,) which is given to cattle as a medicine, and used in the process of tanning, or rather dressing and preparing the hides to be tanned. It forms a considerable native article of commerce in these districts, and as the process of making it differs somewhat from that of saltpetre, I shall on a future occasion attempt a description of the native manufacture. An examination of the water from about 20 wells at different distances from each other, on the road between *Singhea* and *Mow*, (about 20 eoss,) produced the following amount of saline matter, contained in a standard English gallon :

Sulphate of soda,.....	26.4 grains
Muriate of do. ....	11.2 do.
Nitrate and carbonate of lime,.....	12.8 do.

Total of saline matter in solution. .... 50.2 per gallon.

The above samples of water forming an average from 20 wells was taken in the month of April, 1833, and forming a line of considerable distance east and west through the south part of *Tirhút*. This result is a tolerable approximation to the contents of the saline nature of the soil.

A sample of the water of the river *Gandak*, taken from the stream opposite *Singhea*, this present month, gave me nearly 2 grains of muriate of soda in 16 oz. or a pint measure. The tests did not indicate any other kind of saline matter in solution. It is worthy of remark, that the water of the river *Són* at this time is perfectly pure, at least I could not detect any saline matter in solution by various re-agents. It ought in consequence to be used in preference to any other at this season by every one, even at a distance, who can afford the expense of carriage. I have ventured an opinion, that the tumours or swellings of the throats of the natives dwelling on this side of the Ganges are caused by the saline nature of the water they are under the necessity of using at this season of the year. Be this as it may, the hint may not altogether be uninteresting to the medical gentlemen of these districts, and who may hereafter establish as a fact what I have merely hinted as a crude opinion.

In conclusion, I have to remark that the above efflorescence of sulphate of soda may hereafter, when European skill and capital becomes more abundant in these productive districts, be converted into a valuable article of commerce ; for it is manufactured in England and France at a great cost from the muriate of soda, by sulphuric acid, and was valued in the London market in the year 1830, at from £8 to 10 the ton. It is almost unnecessary to add, that there is a sufficient quantity of this article in *Tirhút* and *Sarun* to supply the whole of India with Glau-ber salts to be used in cooling wines, and water, or along with other salts used for the purpose.

V.—*Meteorological Register for 1833, kept at Bancoora, by J. McRitchie, Esq.*

Month.	Ther. Low- est.	Ther. High- est.	Bar. Noon.	Bar. 10 P. M.	Rain.	Wind.	Aver. Rain 4 years.	Strs.	Gen. Remarks.
January,	62.1	67.8	29.75	29.86	...	w.	.41		6 days obser- vation-fine and dry; the out- side, 7 A. M. 42.
Feb.	...	...	...	...	.550	w.	1.068		Sometimes cloudy, generally dry.
March,	...	...	...	...	...	w.	1.340		Strong westerly winds; very hot; eddies.
April,	89.1	95.2	.56	.55	.550	n. w.	2.109		Occasionally va- riable winds; showers two and three, with thunder and lightning.
May, ----	86.6	92.6	.45	.46	6.803	s. w.	4.197	21st 1 sevr.	Winds variable after 21st; very hot and close.
June, ----	93.	97.5	.37	.36	7.513	w. v.	9.359		7 days' obser- vations—awful- ly hot till 10th; rains set in with slight showers.
July, ----	86.2	90.	.34	.33	7.171	s. w.	11.470		Heavy showers first, lighter afterwards.
Augt. ----	85.5	88.8	.39	.38	10.235	w. n.w.	11.250		26th, $\frac{1}{2}$ past 11 P. M. two shocks; rn. very heavy occasionally.
Sept. ----	85.7	90.1	.40	.40	7.011	s.	7.584		Some heavy shoo- wers, light to- wards the end of the month.
Oct. ----	81.5	88.	.61	.77	1.600	s. e.	3.587		Generally hot, cloudy wea- ther; partial showers.
Nov. ----	75.	81.	.80	.78	...	n. w.	1.384		Fine throughout
Dec. ----	70.5	75.	.72	...	2.198	w.	.909		Cloudy, with a good deal of rainy weather.
Ther. and Bar. aver.									May 21st, rain fell 3.285. in.
1833.	77.5	82.6	29.57	29.59	43.633	wy.	54.451	Oct. 7 one sev.	Var. in Bar. .26
1832.	76.9	82.1	.59	.57	...	w.n. w.	...	Oct. 31 one very sev.	Oct. 7th, rain fell 3.895.
1831.	76.1	82.2	.60	...	...	...	...	Var. in Bar. 700.	Var. in Bar. .480

NOTE.—We have omitted the columns of rain for 1830, 1831, and 1832, which will be found already printed in the Journal—(see volume I, page 154, and vol. II, page 183.)—ED.

VI.—*Experiments on the Preservation of Sheet Iron from Rust in India.*  
*By James Prinsep, Sec. &c.*

The proposed extensive employment of iron steam boats for the navigation of the Ganges, rendered it a desideratum to ascertain what varnish or composition would best preserve the exterior surface of such vessels from the rapid corrosion to which iron is so peculiarly subject in a hot climate. A series of experiments was undertaken with this view by myself at the requisition of Government; and it may perhaps be useful to record the principal results in a journal of science.

Two sets of six wrought-iron plates, each measuring three feet by two feet, were fixed to two iron triangles, the plates being prevented by studs from coming into contact with each other. The same varnishes were applied to both sets, one being intended for entire submersion under water, the other to be only half immersed, in order to feel the united influence of air and water.

The following were the coatings applied :

1. Common coal tar, laid on hot, and the plate heated.
2. *Theetsee* varnish of Ava, one coat. This took a very considerable time (two months) to dry, kept first in a cool-room, and afterwards in a room heated by furnaces\*.
3. Native *Dhúna*, applied to the iron hot, in a thick uneven coat.
4. Best white-lead paint, three coats; allowed to dry and harden for nearly three months.
5. Coach-makers' varnish, two coats; dried rapidly.
6. Spirit varnish, several coats; warmed.
7. White wax, melted on the surface.
8. White wash, of pure lime water.
9. The surface of the iron plate cleaned and guarded with an edging of zinc soldered on.
10. The natural surface of the rolled iron sheets, covered with its usual hardened grey oxide.

Many of the foregoing were employed from curiosity only, especially No. 6, the spirit varnish, which had on many occasions proved quite ineffectual in preserving the surface of polished iron and steel from rust in the atmosphere of Calcutta.

The two frames were suspended as above described, one under water, the other half immersed, from one of the unused dredging boats near the Chitpur lock gates of the Circular canal, where they were left undisturbed for three months, during a period of the year, when the water of the canal was only slightly salt.

\* Major BURNETT states, that three or four days are sufficient for the varnish to dry when laid on wood, (Journal, Vol. I. p 172.) I had not a damp vault in which to expose the plate as recommended by that officer, and that may partly account for the delay in drying; but all varnish and paint takes longer to dry on metal than on wood, from its non-absorbent nature.

They were then taken up for examination, and presented the following appearances.

No.	Varnish.	Plates under water.	Plates half above water.
1	<i>Tar</i> .....	Perfectly preserved and free from rust.	A few dots of rust between wind and water.
2	<i>Theetsee</i> , ....	Perfectly uninjured in appearance.	A line of rust at the level of the water.
3	<i>Dhoona</i> , ....	White and pulverulent; soft and easily rubbed off while wet: rust here and there.	Large cracks from the contraction of the part exposed to the sun, whitened where thick, black where thin; plate preserved, above water.
4	<i>Paint</i> , .....	Almost wholly disappeared, and blotches of rust on the surface.	Paint uninjured above water mark, and plate preserved, but below water entirely removed.
5	<i>Copal varnish</i> ,	Whitened, pulverulent, and soft; but not much oxidated.	In air less, whitened spots of rust breaking out every where.
6	<i>Spiritvarnish</i> ,	Whitened and very rusty.	Very much corroded.
7	<i>Wax</i> , .....	No trace of wax left, and very rusty.	This plate was all under water.
8	<i>Lime</i> , .....	Flaky; peeled off, and very much corroded.	In air remains on and acts pretty well.
9	<i>Zinc</i> , .....	The clean iron excessively corroded and bad: the zinc also oxidated.	Much more rusty in the air than under water, where a kind of crust was formed.
10	<i>None</i> , .....	The natural surface was a little whitened and pretty well preserved.	Rusty on the edges or where it had been scraped; elsewhere little injured.

The superior preservative power of the coal-tar to all the substances tried, with the exception perhaps of the theetsec, was evident; the Burmese varnish laboured under the disadvantage of being a single coat, otherwise it would doubtless, from its hardness, its firm adherence, and its inalterability by water, prove fully equal as a lacquer to the coal-tar: the latter has on the other hand the advantage of drying and hardening as soon as laid on.

The change effected on the resinous varnishes is produced by an actual chemical combination with the water; the soft pulverulent matter is analogous to the white powder obtained by the addition of water to an aleoholic or of acid solution of rosin.

The failure of the zinc guard, which was expected to act as an electro-positive protector to the iron, may I think, be attributed to its being adulterated with lead, which being negative with respect to iron, would cause, as was actually the case, a more rapid oxidation of the latter metal: (the impurity of the zinc was afterwards fully proved.)

The wax and the white paint had entirely disappeared from the surface of the metal under water before the plates were taken up; it is impossible therefore to say in what way their removal was effected.

The bituminous (coal-tar) coating was finally adopted, and it has been successfully applied to the iron steamer, the Lord William Bentinck, lately launched under Captain JOHNSTON's superintendence.

VII.—*Proceedings of the Asiatic Society.*

Wednesday Evening, the 30th April, 1834.

The Right Reverend the Lord Bishop, Vice-President, in the chair.

Read the Proceedings of the last meeting.

Messrs. Wm. MARTIN and THOMAS SPIERS, were proposed as members by Mr. BAGSHAW, seconded by Mr. J. PUINSEP.

Also, Captain W. FOLEY, proposed by Mr. PUINSEP, seconded by Dr. WALLICH.

Read letters from Messrs. N. CANLISLE, Secretary to the Society of Antiquaries, and J. C. MORRIS, Secretary to the Madras Literary and Auxiliary of the Royal Asiatic Society, expressing the thanks of those Societies for the xvii. volume of Transactions.

Read a letter from M. JULES DESJARDINS, Secretary of the Mauritius Natural History Society, acknowledging his election as an Honorary Member of the Society. Mr. CHARLES TELFAIR, President of the same Society, died before he became acquainted with the honor the Asiatic Society had equally intended for him. Mons. J. DESJARDINS forwards a 5th Annual Report of the Mauritius Society in manuscript for the Asiatic Society's Library.

Read a letter from the Committee for concentrating Government offices, inquiring on behalf of Government, whether the Asiatic Society would feel disposed to afford space in their rooms for, and undertake the charge of, the books belonging to the College Library, upon their removal from Writer's Buildings at the close of the Charter, reserving the proprietary right of the books with Government.

It was the opinion of the Committee of Papers that the College Library could not be properly accommodated without some additions to the museum on the north of the building: this perhaps the Government might consent to make, as the books were to remain public property: in other respects the measure appeared highly desirable and the offer should be accepted. The subject was dropped on an intimation that an arrangement had been made, subsequent to the Committee's letter, for retaining the library in the premises it now occupies.

*Library.*

The following Books were presented:

The Indian Journal of Medical Science, No. 4.—*By Messrs. J. Grant and J. T. Pearson, Editors.*Madras Journal of Literature and Science, No. 3.—*By the Madras Literary Society.*RAMCOMUL SEN's English and Bengalee Dictionary, 2nd part, translated from Todd's edition of Johnson's Dictionary.—*By the translator.*Lieut. J. BRADDOCK's Memoir on Gun-powder.—*By the Author.*Proceedings of the Natural History Society of Mauritius, from July 1833, to January 1834.—*By the Society.*Report on the Inland Customs and Town Duties.—*By Mr. C. E. Trevelyan.*Illustrations of the Botany and Natural History of the Himalayan Mountains, &c. Part 1st.—*By J. F. Royle, Esq. F. L. S. G. S. and M. A. S. &c.*

Mr. BAGSHAW stated that it would be a great convenience to Members to have a revised catalogue of the library: whereupon, finding that the

former edition was nearly expended, it was *Resolved*, that a new catalogue be printed, comprising also the objects in the Museum.

MR. J. T. PEARSON, inquired whether any steps had been taken regarding the matter of compounding for subscriptions: *Resolved*, that a report be requested from the Committee appointed on the 26th June last, to consider the subject.

### *Physical.*

Read a letter from Major BURNEY, Resident of Ava, forwarding a collection of mineralogical specimens, consisting of:

Ores of lead, copper, antimony, iron and arsenic: and rock specimens, from the Shan country to the east of Ava.

Sulphate of lime, from the petroleum wells at Yenangyoung.

Specimens collected by Captain MACLEOD in a journey to Manipur: of copper ore from Laypadoung on the Khyendwen river:—also of hornblende, volcanic rocks, and saline efflorescence from a sulphureous lake called *Myouk dwen* (northern well) near Lemye on the left bank of the Khyendwen.

Also, coal from the Angoching hills, fossil wood from Taroup myo, left of the Irawadī river; and the sand from which gold is washed at Kenau immediately above Kendat on the Khyandwen river.

Waters from the lake above mentioned and from a well in the neighbourhood (unexamined), and a root from Shan, smelling like celery, used with clothes to give them a scent.

Major BURNEY writes:—“ During my last journey up here I collected a good many fossil specimens near Yenangyoung, and particularly teeth of the Mastodon, and Elephantoides. Captain MACLEOD also during his late journey by water to *Kendat* (Gendah of our maps) found much of the country in that quarter indicating the presence of fossil remains, and picked up several portions of the jaws of the Mastodon, and Elephantoides with teeth. The Burmese ministers have ordered their officers at Yenangyoung to gather all the fossil bones they can for me, and as soon as I procure a large collection, I will send the whole to you for examination.”

A series of geological specimens from Southern India, was presented by Lieutenant BRADDOCK on the part of a gentleman at Madras.

They consisted principally of:

Gneiss, greenstone, laterite, and magnetic iron ore from the Neelgiris.

The garnet-gneiss, of Coimbatoor and Salem.

The decomposing mica-schist, and gneiss; yellow earth;—feldspar with magnetic iron, and quartz with ochreous clefs;—all which are washed (with or without previous burning) for gold, in the large gold district of Mysore.

Two handsome varieties of porphyry from Seringapatam.

Shell limestone from 12 miles W. of Pondicherry used for ornamental purposes.

Sandstone, slate-clay and other rocks of the Southern diamond formation, which have been fully described by Dr. HEYNE and VOYSEY.

Specimens of the volcanic mud from Kyook Phyoo, presented by Captain WARDEN.

### *Antiquities.*

The Secretary submitted a translation of the inscription in the Páli and Burma character on the large monumental stone from Arracan, presented

to the Society by H. WALTERS, Esq. in May, 1833 ; the notice of which at the time was deferred in expectation of receiving a translation and account from the donor.

The translation has been made by a native Christian of Ceylon named RATNA PAULA, who is well versed in the Burma language, and who prepared the catalogues of Burma MSS. in the Society's library.

The inscription (although very recent) is of considerable interest as describing the early history of the introduction of the Buddhist religion into Arracan from Ceylon, and the reform of various abuses in dress, and corruptions in the holy texts which had from time to time crept in. The principal object, however, is to commemorate the erection of a temple called *Kalyani Simtokri* at *Romavaté* in the island of Yanbya Koyan, in the year of Sakha raj 1148, (A. D. 1786.)

Read, letters from Captain CAUTLEY, forwarding a further supply of coins and other relics discovered in his occasional visits to the site of the subterranean town at *Behat*, with a plan of the neighbouring country, and an explanatory notice by the discoverer.

[This will be printed in our next.]

Captain CAUTLEY's last letter notices that on a revisit to the spot at the Kalaawala pass, where he had in 1827 made the discovery of what was then supposed to be a bit of fossil wood\*, but which proved on Dr. FALCONER's examination to be bone, he has been so fortunate as to find another silicified bone, some teeth and a number of other remains, all apparently belonging to the Saurian family. Dr. FALCONER has also made further discoveries in the Timli pass, and we are led to expect an account of the whole shortly from the pen of the latter gentleman.

A memoir on the ancient coins discovered at Beghram in the Kohistán of Kabul, by CHARLES MASSON, was read.

[Printed in the present number.]

This highly interesting paper was communicated by Doctor J. G. GERARD, who fell in with the author at Kabul, on his return from Persia. Doctor GERARD founded upon the very successful issue of Mr. MASSON's researches a distinct proposition addressed to the "President of the Meeting of the Society."

The Right Reverend the Vice-President, proceeded to read Dr. GERARD's paper to the meeting ; whence it appeared that two offers were laid before the Society :

1. To employ Mr. MASSON, on the part of the Society, to continue the prosecution of his researches in Afghánistán.

2. To secure by purchase the possession of the valuable relics he has already collected.

The two questions, as connected with the present means of the Society, were referred to the Committee of Papers for consideration and report.

A Memoir on the Topes of Afghánistán, by Doctor J. G. GERARD, also addressed to the Presiding Member of the meeting, was laid on the table.

A paper by Mr. B. H. HODGSON, Resident at Kathmandu, entitled Classification of the Néwârs, or aborigines of Népál proper, preceded by a legendary account of their early history, was also submitted, but not read on account of the lateness of the hour.

\* See Asiatic Researches, Vol. xvii.

## VIII.—European Science.

## On the Longevity of Plants, and the Means of Ascertaining their Age.

[Translated for the J. A. S. from the Original of Professor de Candolle, at Geneva.]

A tree may be considered in two points of view, either as an assemblage of as many individuals linked together as there are buds developed on its surface; or as a single being, analogous to what is called an individual when speaking of an animal. According to the first, which is probably the most rational view, it cannot be astonishing that, while new buds are incessantly being added to the old, there should be no necessary term to the existence of the aggregate body. By the second, which is the most common, it must be allowed that, as in the greatest number of trees a fresh layer of wood, and in general new organs, are formed every year, there cannot exist in the vegetable world that hardening or that obstruction of the old and permanent organs which produces death from old age properly so called, and that consequently trees should never die but from accidental causes. By either of these hypotheses it is equally shewn that trees do not die of old age in the real sense of the phrase; that there is no definitive term to their existence; and that consequently some may be found that have attained an extraordinary age. But it is not sufficient to advance such an opinion; we must endeavour to prove its truth. Already two remarkable examples have been quoted; that of the *Baobab*, which ADANSON by ingenious and plausible calculations, has proved to be 5150 years old, and that of the *Taxodium (Cupressus disticha, Lin.)* which from analogous reasoning may be considered still older. (See the notice on these trees by MR. ALPH. DE CANDOLLE in the *Bibl. Univ.* April, 1831.) Other, though less remarkable cases, seem to confirm the idea that there still exists in the world trees of prodigious antiquity, that have witnessed perhaps even its last physical revolutions. It is easy to imagine that many errors may creep into calculations of this sort; and that they can only be depended on as correct, when multiplied cases of vegetable longevity shall be discovered to confirm the fact. I have long occupied myself with this subject, as the publication of the *Principles of Botany*, inserted (in the year 1805,) in the first volume of the *Flore Française*, will prove; but the life of man is too short for such researches: opportunities are rare; and examples should above all be sought for in those countries which are not subject either to frost or to the destructive hand of man. The methods also of proving the age of old trees is not perhaps sufficiently known to travellers, or to those who interest themselves in these kinds of inquiries, and I am therefore induced to call the attention of the public to the subject by means of this pamphlet.

A considerable degree of interest would attach to the longevity of certain trees were it only from curiosity. If we consider all the other documents of antiquity as precious, surely we cannot lightly pass over the knowledge that such a tree is contemporary with the oldest times; in some instances, this knowledge might throw light on the history of monuments, as in like manner the history of monuments may assist our inquiries into that of their neighbouring trees. This question might even become of great utility in the history of the globe. If the certified number of these veterans in the vegetable kingdom were to become very considerable; if in the course of time their age were ascertained with greater certainty; might we not find in these facts some means of fixing the approximate date of the last revolutions of the earth? If inquiries of this kind were made in volcanic or

madreporic islands, might they not give some idea of the date of their origin? But ceasing our conjectures on subjects of such magnitude, if we reflect on the means of attaining the solution of the question, we shall see that they are all founded on an exact *appreciation* of the laws which govern the growth of trees; and this knowledge may throw light on many parts of vegetable physiology and of the forester's art. I believe therefore that such researches may become useful; but even should they prove but curious, I should still not think them unworthy of being offered to the public; for curiosity is an insatiable appetite that the mind of man takes pleasure in satisfying, in proportion to the quantity of food which has already been provided for it.

It is well known that plants destined to attain the character of trees may all be classed under two heads. The first, which are the most numerous, have the trunk composed of a body of wood coated with bark; they grow by the annual addition of a new layer of wood, which is produced outside the old wood, but within the bark; these layers of the young wood being the most exterior, the name *exogenous* has been given to such plants when speaking of their growth, and that of *dicotyledonous* when alluding to their germination. Under the second head are placed, on the contrary, all those plants whose trunks, being sensibly cylindrical and generally unadorned by branches, show only a body of wood without any bark properly so called; of which the exterior fibres are the oldest and most hard, and the interior fibres the softest and youngest. They have obtained from this last circumstance the name of *endogenous*, by which they are distinguished when alluding to their growth, and which is synonymous to that of *monocotyledonous*, used when speaking of their germination. We will rapidly examine the means of ascertaining the age of individuals belonging to these two classes, and will afterwards add a few remarks on vegetables more humble in their appearance, but whose duration offers matter for special consideration.

Almost all trees that are natives of the temperate zones, and consequently of the most civilized parts of the world, are exogenous: their nature and history have therefore been examined much more closely than any others, and may afford us the most interesting data.

It is now ascertained beyond a doubt, that exogenous trees increase annually by a new layer of wood, and consequently the number of concentric zones visible on the transversal or horizontal section of a trunk may give an idea of the number of years that have elapsed since the part of the tree under examination began to vegetate. It follows that a slice cut at the bottom of the branch will give the age of the branch; another made at the bottom of the trunk, or at the neck, will give the age of the tree. If, as has been asserted, irregularities may occasionally occur, and this is a very doubtful point, it may at least be affirmed, that the probability of deviation from the law are so slight, that we may boldly argue on the hypothesis that a given number of layers indicates the same number of years' growth; consequently, whenever a clean section of the trunk can be attained, this very simple criterium is sufficient to discover the age of a tree. But the inspection of these concentric zones ought to be made with greater care than has hitherto been bestowed on it. The zones, by their number, give the age; but by the proportion of their thickness they give the mean rate of increase. It is not sufficient therefore to count them, they must be measured. The following is the very simple means I made use of to attain this end. When I met with a clean cut of an old tree, sufficiently healthy to observe its layers, I placed on the branch a slip of paper, reaching from the

centre to the circumference; on this slip I marked with a pen or pencil the meeting of each zone, the size of the pith, and that of the bark; writing on it the name of the tree, the country to which it belonged, and any particulars which deserved notice. My collection of these slips, (which have no small resemblance to the measures preserved in a tailor's shop) gives me an exact estimation of the different growth of different trees, and the means of comparing one with another. I take the precaution of marking in a more decided manner every tenth ray, which gives me the average rate of increase for every ten years growth.

My measure, being taken from the centre to the circumference, expresses the radius. I double it, if I require the diameter; I take six times if I wish to have the circumference of the woody substance. It is not so useful, except in some particular instances, to make these observations on young trees; for in working on the older ones, of which every species may be procured, there is the advantage of being able to judge of the trees in every stage of their growth. As it would be inconvenient to publish an exact copy of these slips of paper, which are sometimes several feet long, I shall give an idea of their results, by the following table: [We have converted the French lines into English measures.—ED.]

*Table of the growth of some exogenous trees, as measured by their increase of diameter in periods of ten years, expressed in inches and tenths, English.*

Years of age.	Oak ( <i>peduncu- lata</i> ,) aged 130 years.	Oak ( <i>Sessili- flora</i> ,) aged 210 years.	Oak (ditto,) aged 333 years.	Larch, aged 255 years.	Elm, aged 335 years.	Fir, aged 120 years.	Yew, aged 71 years.
1 to 10	4.8	0.9	1.6	4.2	1.4	3.6	0.7
10 to 20	5.5	1.4	2.9	5.4	3.8	4.7	1.0
20 to 30	4.8	2.0	3.4	5.1	5.1	4.6	1.1
30 to 40	5.3	1.1	3.3	6.4	6.4	3.9	0.9
40 to 50	4.2	1.2	2.1	4.0	7.7	3.0	0.6
50 to 60	3.9	1.3	1.1	5.0	6.8	3.1	1.1
60 to 70	4.9	1.0	0.8	4.0	6.9	1.6	0.7
70 to 80	3.9	1.0	0.8	2.6	5.8	1.5	
80 to 90	2.8	0.8	0.7	2.6	5.2	1.2	
90 to 100	2.8	0.8	0.7	2.2	3.9	1.2	
150 to 160		0.7	0.7	1.9	1.7		
200 to 210		0.8	0.7	2.0	3.0		
250 to 260			0.7	1.8	2.1		
300 to 310				0.8	1.4		
320 to 330				0.7	1.9		

It results from these observations, that in the advanced periods of their life, trees continue to form layers which do not yield in thickness to those of a middling age; that every species, after having grown rapidly in its youth, appears at a certain age to attain a stated and regular growth. In fact, a tolerably good reason may be assigned for these differences, by assuming, that during the first period, that is to say, before 60 or 80 years, the roots and the branches of forest trees, not being confined by their neighbours, grow freely; but that, after that age, they grow less rapidly, on account of their encountering the roots and branches of neighbouring trees; finally, that inequalities of growth are owing either to the quality of the zone or stratum of earth from which the main portion of the roots are drawing their nourishment, or to the circumstance of the neighbourhood of the tree being more open and clear at some periods. Such calculations made on a great variety of species, and on individual trees of every species, would give the most interesting results regarding the progress of vegetation:

1st. They would establish for each species an *average* of its annual increase, so that by knowing the circumference of an exogenous tree, its age might be also pretty accurately ascertained. It must be kept in remembrance that great variations take place during the first period, and that afterwards a more uniform growth is established.

2ndly. The mean growth and mean solidity of any species of wood being given, the thickness of the layers of an individual specimen will enable us to judge, whether it possesses all the natural qualities belonging to its species; thus it may be inferred, that the oak No. 1 of the table, is very inferior to the oaks 2 and 3, because the thickness of the layer is too great for the wood to have acquired its full hardness.

3dly. If the law I have assumed is true, that at a certain age (60 or 80 years for oaks) every tree ceases its more rapid growth, and assumes a more regular progress, then we may deduce precise rules as to the most suitable period for cutting down certain trees. I am inclined to believe, therefore, that tables of horizontal cuts would be of very great use, and I recommend their preparation as well to travellers as to those engaged in extensive timber-works and building concerns.

2. When the transverse section of the stump cannot be obtained, a second method presents itself, by which the growth may be determined; which is, to look for the old individuals of every species of which the date is ascertained, to measure their circumference, to deduce from thence their average growth, and to make use of this to calculate the age of other trees of the same species; bearing in mind, that, except in local circumstances, a measure taken from a young tree always produces too great a result for the growth, and too small a one for the age, of old trees. EVELYN mentions, that a Dane, named Henri Ranjovius, planted in *Ditmarches*, in the year 1580, a certain number of trees of various kinds; that he placed near each a stone recording its date, that posterity might know their age. It would be very interesting to ascertain, whether these trees are still in existence, and if so, to know their circumference; in fact, it would be interesting to have the circumference of every ancient tree the origin of which is known. I invite all who have such particulars, either to publish them, or to communicate them to me; for such observations can only prove useful by comparing them with other recorded facts.

3. For trees of slow growth (*séculaires*), it is useful to have their circumferences at different known periods, so that they may be compared one with another, or with other measures of the same tree which may be taken sooner or later; these comparisons would afford means for better calculating the law of growth, and of appreciating the influence of differences in age; thus, for example, the cedar in the garden at Paris, which was measured when 83 years old, was 113 inches in circumference, which would indicate an average of nearly 0.44 in. growth in the year, but it was measured when 40 years old, and had then already 84 in. circumference; from which it seems that it grew 0.66 in. a year during the first 40 years, and only 0.23 during the following 43 years: consequently if the age of a very old cedar were required to be calculated, we should not probably go far wrong in taking this last number as a multiplier; thus the cedars at Liban measured in 1660, by MAUNDRELL and POCOCK, which were 12 yards and six English inches in circumference, must have been about 609 years old; and in 1787 when they were again measured by Mr. LABILLARDIERE, about 800 years. But the calculation is doubtful since it only rests upon a single example: it would become more certain in proportion as the number of instances becomes greater.

4. It would moreover be useful to take the circumference of very old trees, whenever met with, even when their date is not known. These measures repeated

at certain intervals would shew the law of increase in the diameter of old trees, and compared with other measures, would afford approximate means for estimating their age. Thus we find from EVELYN that there existed in 1660, an immense oak at Welbeck-lane, which was 33 feet 1 inch in circumference, (nearly 11 feet diameter); this same oak, though mutilated, still existed in 1775, and had a diameter of 12 feet; it had grown 12.6 in. in 120 years, a little more than a tenth of an inch yearly. From whence it may be concluded, that the law of increase, indicated by the oak in my table which was 333 years old, holds nearly good for a tree of much greater age: therefore, if the oak of Welbeck-lane be calculated by the tabular data of the oak of 333 years, it will be found that, in EVELYN's time, it must have been nearly 1300 years old; and more than 1400 years old, in 1775.

5. Finally, in cases where it is impossible to obtain the transversal cut of an old tree, there may be opportunities of making a slight incision on the side and discovering how much it has grown in a given number of years, and thus providing a minimum of its mean growth. This is the method by which ADANSON discovered the age of the Boababs. He saw how much these trees had grown in three centuries, and knowing at the same time the growth of young trees, he was able, by an *average*, to estimate the general law. The age of the *Taxodium* of Chapultepec in Mexico might be examined in the same way.

By following out the five methods indicated above, either separately or unitedly, the age of old exogenous trees may be ascertained in a manner which will sufficiently answer the subject of this inquiry. Let us now point out the trees to which our attention ought principally to be directed. The greatest longevity in the vegetable kingdom ought to be found, 1st, in trees which by their hardness, their incapacity of decay, or their size, are the best able to resist destructive agents; 2nd, in countries which are not liable to frost or to other causes which too frequently tend to kill large vegetables.

Among European trees, we may mention the following examples:

1st. The young Elm, as is known, grows to a large size; but its growth is tolerably rapid. The particular one which I have marked in the table above grew near the town of Morges: the observation of its layers, and the account of its fall, was kindly communicated to me by Mr. ALEXIS FOREL; its section shewed it to be 335 years old; it was at the period of its fall perfectly healthy, and had grown in a humid and light soil: its stem was 17 feet 7 inches in diameter at the neck, 30 feet circumference below the spring of the branches, at 12 feet from the ground; and one of the fine large branches attained 16 feet in circumference; the tree fell in fine weather, the soil having been probably injured by the waters of Lake Leman. It had grown at an average 0.3 in. a year, but if the period be divided into centuries, it will appear that it grew .33 a year during the first century, .23 during the second, and .25 during the third; these calculations accord with those which are generally afforded by young elms planted in front of the French churches by order of SULLY. It is important to distinguish the progress of increase in elms *with large* from the rate in those *with small leaves*; the latter are most long-lived and appear to grow more slowly.

2nd. I saw in 1814, at Gigean, near Montpellier, an Ivy tree the stem of which near the ground was six feet in circumference, and which attracted attention by its extraordinary size. Another ivy, 45 years old, was only 7½ inches in circumference. Were this to be taken as an example, the ivy at Gigean must have been 433 years old in 1814, and must now be about 450 years old, if as I hope, it still exists; it is pro-

bable, if there be the same degree of error in this as in the following instances, that I have made too low a calculation of the age rather than otherwise.

3rd. I have given in the above table the measure of a Larch 255 years old. On its authority, we may believe that there exist some which are five or six hundred years old, but the measures of their layers must be increased in number before the fact can be decided.

4th. The Linden (*Tilleul*) is a tree of Europe, which up to a certain period appears capable of acquiring a very great diameter. That which was planted at Fribourg in 1476, in commemoration of the battle of Morat, is now 13 feet 9 inches in diameter, which shews an increase of diameter of about .20 in. yearly. This ratio, equal to that of the oak, appears to me to shew that the tree had not encountered very good soil, and I am inclined to believe that we should be nearer the truth if we allowed an average of .35 in a year. As there are in Europe a great number of large lindens, it would be interesting to note the circumference of those, the dates of which are known. I shall mention, on account of their size, the following trees:—that of the Castle of Chaillé, near Melles, in the department of Deux-Sèvres, which in 1804 was 49.2 feet in circumference, and which was I imagine then about 538 years old; that of Trons in the Grisons, known so early as 1424, which in 1798 was 54 feet in circumference, and I imagine 583 years old; that of Depeham near Norwich, which was 8½ yards in circumference in 1664; that of Newstadt in Wurtemberg, which was large enough in 1550 to require support, and which in 1664 was 37 feet four inches in circumference, &c. Should any attention be hereafter bestowed on lindens, those with large and those with small leaves ought to be carefully distinguished; the former appear to grow more rapidly than the latter.

5th. The Cypress is certainly, among the trees which belong to the South of Europe, one which lives to the greatest age, and the usual custom of planting these trees in church-yards has gained for them a degree of respect, and preserved them conveniently for our present object. Hunter says that in 1776, there was one in the palace garden at Grenada which had acquired celebrity at the time of the Moorish kings, which were then called *Cupressos de la Regna Sultana*, because a Sultan there met with Abencerrage. But I can discover nothing certain regarding the growth of these trees, which I therefore point out for the attention of naturalists.

6th. Chesnuts appear capable of attaining a very great age; but I do not find this opinion on the celebrated *châtaigner des cent chevaux* on Mount Etna. Mr. SISIÖND and Mr. DUBY have communicated to me particulars regarding this tree, which appear to prove that its circumference, which is 70 feet, is owing to the union of several trunks in one. The growth of this tree must be calculated on single stems: there were several very large ones on Mount Etna. PÖDERLE mentions having seen one of fifty feet circumference in the county of Gloucester, which was believed to be 900 years old. It would be desirable to possess accurate information regarding the growth of this species.

7th. The East Indian Plane-tree (if it may be numbered among the European trees) is certainly one of the largest, but the law by which its growth is governed is not known. There is in the valley of Bujuk-déré, three leagues from Constantinople, a plane which reminds us of the one on which Pliny has conferred such celebrity; it is 150 feet in circumference, and has a central cavity of 80 feet circumference. I would beg travellers to prove first, if this forms a single tree, or whether it be formed by the union of several. Secondly, how much it has grown during a certain period?

this may be determined by a lateral cut which will allow the layers to be counted. Thirdly ; what law governs the increase of plane-trees for the first century of their growth ?

8th.—The Walnut tree is also worthy the examination of observers. Scumozzi, the architect, mentions having seen at St. Nicholas in Lorraine a table made of a single piece of walnut wood, which was 25 feet in width, and at which the Emperor Frederick III gave a celebrated repast. No conclusion can be drawn as to the age of such a walnut, seeing that the progress of the growth of these trees when old is unknown ; this might however easily be verified.

9th.—The Orange and Citron are among the number of trees cultivated in Europe, which grow the most slowly, and arrive at the greatest age. It is asserted that the orange tree of the Convent of St. Sabine at Rome was planted by St. Dominique in 1200, and that of Fondi by St. Thomas D'Aquin in 1278. The measure of these trees, and the verification of these traditions, might give an approximation as to the annual growth of the *Agrumi* of Italy.

9th.—The Cedars which I have already mentioned, though they appear to me younger than they are believed to be, are still worthy the attention of observers.

10th.—Oaks certainly stand among the veterans of Europe, but their study is still involved in much uncertainty, either because this tree is one of those which according to the acknowledgment of all foresters are the most modified by the soil, or because the wood of the *Quercus pedunculata*, which grows quickly and runs to a great height is almost always confounded with that of the *Quercus sessiliflora*, which grows more slowly, and becomes harder and more crooked. The result of this confusion, is an impossibility of making comparisons from the documents we already possess. In EVELYN'S *Sylva*, a valuable work, from which I have frequently taken useful hints, many examples may be seen with regard to the size which oaks may attain. I have reason to believe that there still exist in our own country, oaks from 1500 to 1600 years old ; but it would be desirable to have these dates verified by further careful inquiries.

11th.—The Olive is also a tree possessed with the power of growing to an astonishing age in countries where it is not subjected to the pruning knife. Mr. de CHATEAUBRIAND in his *Itineraire*, says, that the eight olives in the garden of the same name at Jerusalem only pay one *medin* each to the Grand Seigneur, which would tend to prove that they already existed at the time of the Turkish invasion, for those planted since that period, pay the half of their fruit. The largest olive in Italy, mentioned by PICCONI, is at Pescio : it is 25 feet in circumference. If we admit the estimate given by MOSCHETTINI that the olive grows 0.13 in. yearly, it must be about 700 years old ; but this estimate taken from younger olives must be below the truth.

12th.—The Yew appears to me, of all European trees, the one which lives to the greatest age. I have measured the layers of an yew, 71 years old ; OELHAFEN, of one of 150 years old ; and VEILLARD, of one of 280 years : these three measurements agree in proving that the yew grows a little more than 0.10 in. a year during the first 150 years, and less than a 0.1 from the age of 150 to 250. If we allow an average of one-tenth a year for the oldest yews, it is probable that this exceeds the reality, and that by considering the number of their years to equal the number of lines in their diameter, they will be pronounced younger than they really are. Now I find four measures of remarkable yews in England ; those of the ancient Abbey Fontaine near Reppron, in the county of York, known in 1133, were in 1770, according to Pennant, 1214 lines diameter, or more than 1200 years old.

Those in the church-yard of Crowhurst in Surrey were in 1660, according to EVELYN, 1287 lines in diameter. If, as is asserted, they still exist, they must be 1150 years old.

That at Fotheringale, in Scotland, had in 1770 a diameter of 2588 lines, and is consequently 25 or 26 hundred years old.

That in the church-yard of Braburn in Kent had in 1660 a diameter of about 2880 lines, and if it still exists, it must be 3000 years old.

I point out these trees to the botanists and foresters of England, in order that they may confirm their measurements, and if possible, prove the law which governs the increase of diameter, for it is in England that the veterans of European vegetation are to be met with.

With the same motive, I recommend to those who may have an opportunity of doing so, to study the law of growth, and the dimensions, of the following trees ;— the Indian Date, the Box, the Carob tree, the Beech, the *Phylliria*, the *Cercis*, the Juniper, &c. regarding which we have little information.

Among the exogenous trees in countries between the tropics, the two following have been mentioned, the *Cheirostemon*, (because there is a tree at Toluca, which has been known since 1553,) and the *Cciba*, which has attracted attention from its size ; but it is not probable that trees with such soft wood should live to a great age. I confess however that the instance of the *Boabab*, which although not a very hard tree, exceeds 5000 years, according to ADANSON, shews the necessity of circumspection in making this assertion. I would rather draw the attention of travellers to large trees with hard wood, such as the mahogany, which generally attains seven feet diameter ; the *Courbaril*, which it is said acquires a diameter of 20 feet in the Antilles ; its great hardness is an argument for its very slow growth. The different trees known by the name of Iron-wood, the *Pinus Lambertiana* of California, which is said to be from 150 to 200 feet high, and has a circumference of from 20 to 60 feet ; the fig trees of the Iudian pagodas, &c. I would especially recommend travellers to examine all that regards the *Taxodium* (*Cupressus disticha*, L.) of Mexico. The immense tree of Chapultepec, which is said to attain 117 feet 10 inches circumference ; is it really a single tree or formed by the union of several others ? Has it a hollow cave at its base like those of Louisiana, which is said to belong to the same species ? Has its measure been taken above this cone, as probably ought to be done, if the cone exist ? I recommend a fresh examination of this gigantic tree : it concerns perhaps the oldest tree on the globe.

The age of *indigenous* trees is more difficult to ascertain than that of *exogenous*, both from the country to which they belong having been less studied, and on account of the absence of the woody layers, and the preservation of the same diameter at different periods, which renders their examination more difficult. *Indigenous* trees generally appear under two forms ; the first, such as palms, have, almost all, the trunk *single* and marked, at least during the greater part of their life, with circular rings placed at very nearly regular distances ; the others, such as the *Dracena*, have the trunk adorned with branches and are without rings. The age of palms may be estimated in two ways, very analogous to each other, namely ; 1st, by the height which the trees reach at, compared with the experimental knowledge of the rate of growth of each species ; 2nd, by the number of rings, and their mean distance compared with the length of the trunk. These two methods rest chiefly on the knowledge of the height of trees, as the study of the age of exo-

genous trees depends on their thickness. It is necessary then in the first place to recommend travellers to note exactly the circumference of the trunk of every species of palm. It should also be required of them to determine the height of palms of every species, and to decide from observation, whether the rings visible on the exterior really indicate, as is asserted, the annual growth, or any other definite period.

The first method applied to the Date-palm appears to give results which are conformable to truth. Thus in 1809, at Cavalaire, in Provence, a date was known that had been sown in 1709; it was then 50 feet high; the greatest height of those of Egypt and Barbary, is 60 feet, and the Arabs consider their longest life to be from 200 to 300 years. It would be necessary to ascertain in what proportions the rapidity of growth decreases at different periods.

By allowing that the rings on the outside of the trunk mark the years, the approximate age of the palms of Brazil might be discovered according to the principles furnished by M. de MARTIUS, in his magnificent work, as follows:

	Height of trunk. feet.	Diameter of trunks. inches.	Distance of Rings. inches.	Probable age. years.
<i>Enocarpus Batavia</i> .....	80	12	7	134
<i>Euterpe oleracea</i> .....	120	8 at 9	4 at 5	300
<i>Euterpe edulis</i> .....	100	6 at 7	4 at 5	300
<i>Iriartea excelsa</i> .....	80 to 100	12	4 at 6	250 to 300
<i>Gulielma speciosa</i> .....	80 to 90	6 at 8	4 at 5	250 to 300
<i>Cocos oleracea</i> .....	60 to 80	12	1 at 2	600 to 700
<i>Cocos nucifera</i> .....	60 to 80	4 at 12	3 at 12	80 to 233

I give these approximations to travellers as mere indications, and to induce them to verify my theory.

As to indigenous trees, which are covered with branches, and are without regular rings, no means have yet been discovered by which to calculate their age, and the entire problem must be left for the solution of local observers. It is known that some trees belonging to this class live to a very great age; such is the celebrated Dragon-tree (*Dracæna draco*) in the garden *Franchi* at *Orotava*, in the Island of Tenerife, which was considered remarkable in 1402, at the time of the discovery of the island, and which was even then an object of veneration to the people. Mr. BERTHELOT (Mem. cur. Nat. vol. 13, p. 781,) who has published a good description of this tree, says that in comparing the young neighbouring *Dragoniers* with this giant tree, the calculations which he had made regarding the age of the latter have more than once astonished him. In 1797, according to M. LEDRU, it was 65 feet in height, 42 in circumference at the middle, and 78 at the bottom. Since then the hurricane of the 21st July, 1819, has reduced its height very much.

I am inclined to believe that among the perennial grasses and the shrubs there are many much older than they are generally believed to be, but no inquiry has been made on this subject. I may cite a few imperfect facts, which may lead observers to turn their attention to the duration of life in these humble plants. I mentioned, in my work on the Organography of Vegetables, the "herbaceous willow," which growing on the thin soil of the Alpine rocks, at the feet of a declivity, gradually lengthens its stem as the earth fills up, so as just to enable it to shew its head above the soil, the top of the tree resembling a grass-plot of several yards diameter. I have tried to lay open the stem of this singular tree, but I never could reach its base: the length laid bare, compared with the extreme slowness of its growth, already indicated a very advanced age.

In the downs of the South of France, the perennial stalks of the *Erynxium* and the *Echinophora* lengthen as the level of the ground rises: I never could succeed in extracting their real root, and I incline to believe that these plants are sometimes contemporaneous with the downs themselves: the runners of the *nymphaea*, the shave-grass, and various ferns, ought also to furnish examples of extraordinary longevity, but I know no certain method of appreciating it.

I will even descend to plants of a still lower class. M. VAUCHER watched a lichen for 40 years, without observing any sensible change of size. How know we that among the patches of moss which envelope our rocks, some may not be coeval even with their birth or elevation? and thus in the beds of certain rivers, some weeds may have been existing ever since their waters began to flow!

But setting aside these obscure objects, and confining ourselves to the noble trees whose history is a matter of general interest, we must acknowledge the solution of the problem, above proposed, to be full of curiosity. Let us hasten to do it before the progress of industry, the calculations of the timber merchant, the change of property, the development of civilization,—have united to destroy the objects of our search. The change of religious opinions, and the extinction of many respectable, though superstitious, feelings, are quickly tending to diminish the veneration that certain old trees were wont to inspire in our ancestors. Let us hasten then to record the dimensions and the dates of those that are still left, and if it be possible, preserve the monuments of ages gone by. I raise my voice on behalf of these medals of antiquity.—I would preserve them from sacrilegious destruction—whether as historical monuments, or as pleasing memorials for the imagination to dwell on. I address myself to the forester, the naturalist, the traveller, the artist; to all public authorities of all nations: I call on them to measure all the oldest trees in their neighbourhood, by the process I have pointed out.—All who have the power of publishing, should at once commit their researches to the press, the only lasting medium of record in our days;—to those who have not, I offer to make the record myself in their names, when possessed of the facts, in a work expressly on the age of trees, for which I have collected materials. Those travellers who are not sufficient botanists to give the right name to a tree, should forward a dried specimen of a branch in flower, to which a few specimens of the wood itself may be added, to serve as the means of measuring the ratio of annual increase.

NOTE. We have for some time sought to give this highly interesting memoir to our readers in its entire shape, because India seems to be peculiarly adapted for the species of research which the author so zealously enjoins. The ancient forests of India, in all ages venerated and fostered by the Hindús, may still contain trees under which RAMA abode in his banishment, or HANUMAN assembled his monkey ranks! Let us hasten to determine the age of those within our reach. The celebrated baniao-tree in Tirkut, for instance, has lost its parent stem, but taking the outermost offset now become a large tree, and tracing the period of its taking root, and applying the same calculation to all the intermediate dependents, we shall doubtless find a very high antiquity for the original tree.

A young friend in the Midoapúr district has already commenced the inquiry on other trees: the following is an extract from his letter.

“ The largest tree I have met with was a *pípal* at Chiliana. It measured 53 feet in circumference at the ground, and 37 at the height of 6 feet. I cut into it and measured 7 rings in 3 inches: now at Midoapur the *pípal* trees give a circumference of 6 feet 1 inch on an average of about 15 to 20 years growth, deducting the bark, 11 inches radius; therefore the Chiliana tree in being 6 feet in radius, should be about 160 years old, which is not much after all.” The *pípal* is a loose grained wood, and easily liable to decay.—ED.

## IX.—Miscellaneous.

1.—*Note on the description of the Iron Suspension Bridge near Sagur.*

In our account of Major Presgrave's bridge, vol. II, page 538, there are a few typographical errors, and inaccuracies of expression, which those interested in similar works may desire to see corrected.

In page 540, in lieu of "the *tension*, to be sustained at each point of suspension would be 85.632 tons, including the load," we should have said, following the authority of the printed account of the work, that the "tension of the bridge and chains *unloaded* at either point of suspension, is estimated to be 95.632 tons while supposing the *clear portion of the platform*, 190 feet by 11 $\frac{1}{2}$ , or 2,185 square feet, to be crowded with men, at 69 lbs. per superficial foot, the loaded bridge will have a weight of 120 tons; and the tension on each point of suspension will result, 217.674 tons. This gives 10 tons for the maximum strain that can be applied to the square inch of sectional area of iron. The general tension will of course be less than half that quantity. There are 780 factory maunds of iron in the bridge, which cost in its finished rate about 19 $\frac{1}{2}$  Ca. Sa. Rs. per maund.

2.—*Mr. Previté's mode of preserving bread for Ships, &c.*

We said nothing of Mr. Previté's prepared milk, because we did not think that its quality was very agreeable to the palate, in fact we doubt whether it be possible to evaporate milk to dryness without changing its properties; but of Mr. Previté's bread we can speak in the highest strain of encomium, from having made a breakfast off his regenerated rusk of November last, in preference to other fresh loaves and rolls on the table! The mode of preservation adopted is simply to drive off all the inherent moisture from the bread by a moderate heat, and hermetically seal it in tin boxes until required. It is then exposed to steam, to supply the natural moisture, and rebaked lightly and rapidly on the surface.

Without detracting in any way from the merit of Mr. PREVITE's invention, we may mention, on the authority of Lieut. BRADDOCK, that the same principle has been long practised at Madras. In the parching land winds in the interior, when bread becomes perfectly dry and hard during a march, the native cooks sprinkle it with water, and place it between two hot earthen pans over a fire; the steam penetrates, and softens the whole mass; the heat is then raised, sufficiently to rebake the surface. We do not know if the same simple plan prevails in Hindustan, but the hint is well worth the consideration of travellers in our hot winds by land or river.

3.—*Illustration of Herodotus' account of the mode of obtaining gold dust in the deserts of Kobi.*

In HEEREN'S Asiatic nations, vol. I, we find the following remarks on this subject, commencing with an extract from Herodotus:

"There are other Indians living near the city Caspatyras and the country of Pactyica, (the city and territory of Cabul,) situated to the North of the rest of the Indian nations, resembling the Bactrians, their neighbours, in their manner of life. These are the most warlike of all the Indians, and the people who go to procure the gold. For in the neighbourhood of this nation is a sandy desert, in which are ants, less in size than dogs but larger than foxes, specimens of which are to be seen at the residence of the king of Persia, having been brought from that country. These creatures make themselves habitations under ground, throwing up the sand like the ants in Greece, which they nearly resemble in appearance. The sand, however, consists of gold-dust. To procure this the Indians make incursions into the desert, taking with them three camels, a male one on each

side, and a female in the centre, on which the rider sits, taking care to choose one which has recently foaled. When in this manner they come to the place where the ants are, the Indians fill their sacks with the sand, and ride back as fast as they can, the ants pursuing them, as the Persians say, by the scent ; the female camel, eager to rejoin her young one, surpassing the others in speed and perseverance. It is thus, according to the Persians, that the Indians obtain the greater part of their gold ; at the same time that the metal is also found, though in less quantities, in mines."

Herodotus has so accurately marked the situation of these auriferous deserts that it is impossible to be mistaken. The nation in whose neighbourhood they are situated "live near to Bactria and Paetica, to the north of the other Indians," and consequently among the mountains of Little Thibet, or Little Bucharia ; and the desert in their vicinity can be no other than that of Cobi, which is bounded by the mountains of the above countries.

There is no doubt that the account of the historian is applicable to this region. We have already remarked that the lofty chain of mountains which limit the desert, is rich in veins of gold ; and not only the rivers which flow from it westward, through great Bucharia, but the desert-streams which run to the east and lose themselves in the sand, or in inland seas, all carry down a quantity of gold-sand. Besides, who knows not that the adjacent country of Thibet abounds in gold ? Nor can we be surprised if, at the present day, the rivers in question should be less abundant than formerly in that metal, as must always be the case when it is not obtained by the process of mining, but washed down by a stream. As late, however, as the last century, gold-sand was imported from this country by the caravans travelling to Siberia ; and under Peter the Great this gave occasion to abortive attempts to discover those supposed Il Dorados, which were not without some beneficial results for the science of geography, though utterly unprofitable for the purposes of finance.

That these were not ants, but a larger species of animal, having a skin, is apparent not only from the account of Herodotus, but from that of Megastheus in Arrian, (India, OP. p. 179,) who saw their skins, which he describes as being larger than those of foxes. The count Von Veltheim in his Sammlung einiger Aufsatze, vol. II, p. 268, etc., has started the ingenious idea that the skins of the foxes, (Canis Corsak, Linn.) found in great abundance in this country, were employed in the washing of gold, and which, as they burrow in the earth, may have given rise to the fable. Bold as this conjecture may appear, it deserves to be remarked, as it is in perfect agreement with what we know of the natural history of the country. The actual observation of fresh travellers can alone afford us a complete solution."

This idea of the skins of animals being used in the washing of the gold sand elucidates well the marvellous tale of the Grecian author. It is a common practice in Savoy to this day. Perhaps however the simple account published in the first volume of the present journal, page 16, of the mode employed by the Burmese in collecting the gold dust of the *Kyenduen* river by fixing the horns of a peculiar species of wild cow in the small streams coming from the hills, to entangle the gold dust in the velvet or hairy coat with which the young horns are enveloped, may throw some fresh light on the subject. The horns (Mr. Lane was informed, although himself rather incredulous) are sold with the gold dust and sand adhering to them for 12 or 13 ticals a piece. Now may it not be very probable that in the gold streams to the north of Himalaya, whole fleeces of some small animal were employed for the same purpose, and were occasionally sold entire ?

## Meteorological Register, kept at the Assay Office, Calcutta, for the Month of April, 1834.

Days of the Month.	Barometer reduced to 32° Fahr.		Thermometer in the Air.		Depression of Moist-bulb Thermometer.		Hygrometer.		Rain.		Wind.		Weather.		
	AT 10 A.M.	AT 4 P.M.	AT 10 A.M.	AT 4 P.M.	AT 10 A.M.	AT 4 P.M.	AT 10 A.M.	AT 4 P.M.	AT 10 A.M.	AT 4 P.M.	AT 10 A.M.	AT 4 P.M.	AT 10 A.M.	AT 4 P.M.	
1	745	746	733	75.0	83.4	95.0	85.8	83.6	1.3	7.1	13.3	2.4	90	77	
2	745	747	848	73.1	83.5	91.5	86.4	74.3	10.5	13.4	5.2	84	79	77	
3	748	747	742	82.5	90.7	86.8	80.0	9.7	9.8	14.3	7.2	65	77	77	
4	749	850	643	73.0	78.2	83.9	93.2	88.7	9.1	15.5	3.4	88	76	88	
5	749	832	708	811	70.2	80.7	94.8	96.8	77.3	1.1	14.6	6.1	83	74	
6	771	715	75.0	75.0	99.5	97.6	91.0	92.6	9.2	15.5	4.5	85	70	70	
7	721	840	621	716	78.0	85.3	98.0	91.2	43.1	2.0	9.5	17.6	10.1	86	
8	670	732	580	718	78.2	85.9	98.0	92.5	74.1	4.2	6.3	16.7	3.9	93	
9	716	690	730	759	74.2	83.2	86.5	97.1	76.2	3.0	8.2	12.1	4.2	91	
10	734	808	675	749	73.1	85.4	96.0	88.5	79.5	2.0	9.4	15.7	3.8	88	
11	766	828	742	813	74.5	84.7	91.0	88.0	77.2	2.4	11.3	11.8	4.0	90	
12	646	822	720	829	76.1	85.1	92.2	88.8	75.1	2.5	7.9	11.3	2.0	90	
13	796	853	721	797	75.2	84.3	92.8	88.4	76.0	2.0	6.9	16.7	4.0	84	
14	772	820	678	738	75.4	85.1	94.0	89.1	80.1	2.3	8.6	14.1	3.1	89	
15	703	750	782	618	696	76.5	85.9	98.1	91.4	85.0	6.7	7.1	11.9	3.6	90
16	687	750	710	633	77.2	86.3	99.6	93.8	83.0	7.5	7.9	10.0	3.6	90	
17	667	684	538	678	82.2	86.3	100.0	94.4	85.7	3.4	8.9	12.3	5.2	88	
18	602	673	544	706	82.4	85.8	95.1	91.8	78.3	4.2	7.4	14.3	2.8	92	
19	616	736	644	672	73.2	84.9	98.0	89.4	83.0	2.8	8.0	9.4	6.4	91	
20	681	753	651	711	82.5	85.4	92.8	88.1	82.0	4.2	14.9	19.1	15.6	75	
21	742	814	636	742	75.0	83.5	95.0	90.9	80.4	7.0	11.7	18.9	3.6	82	
22	643	740	644	748	79.8	86.3	94.2	91.8	81.2	2.0	9.2	11.9	3.4	89	
23	736	809	710	767	78.2	88.3	94.7	92.6	80.2	1.4	13.8	3.4	88	78	
24	625	715	631	78.2	87.8	92.0	90.8	81.2	0.9	8.4	15.0	4.2	89	75	
25	730	808	709	757	80.0	87.8	92.2	90.9	82.0	4.4	7.9	10.4	4.6	90	
26	743	839	708	755	80.4	86.2	92.0	91.0	82.0	4.5	7.8	10.0	4.2	91	
27	733	862	715	786	80.0	88.1	92.4	91.2	81.2	2.2	8.3	10.5	3.6	90	
28	678	776	643	733	81.0	86.3	93.7	91.2	84.2	2.5	8.1	11.0	6.9	91	
29	704	772	641	772	82.3	86.5	103.0	97.5	77.2	4.9	8.3	10.3	5.1	90	
30	753	872	764	826	76.1	88.5	105.0	99.7	83.1	3.7	7.5	8.3	4.0	92	
31															91
Mean, 20,726		801	681	738	77.2	86.5	94.8	93.2	80.2	3.4	8.8	13.8	4.9	88.4	77.8
														2,39	

The instruments for 10 A.M. and 4 P.M. are suspended in the free air of the Laboratory, those for 5 A.M. and 10 P.M. in the south veranda of a third story near the cathedral. The register thermometer for extremes is also in the same veranda. A slight shock of an earthquake was felt in Calcutta and to the north-east of Bengal, A.M. on the morning of the 31st ult.

*Copy of Inscription on stone from Rāmāwati*

# କାଲ୍ୟାଣିପିଣ୍ଡିତାଙ୍କ୍ଷେ





Inscription in the Pili Character and Burma language,  
on a Stone at Bud'dh Gya in Behar.





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